

HERBERT HOSPITAL, WOOLWICH.

R E P O R T

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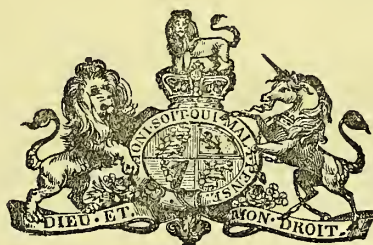
THE RIGHT HON. THE EARL DE GREY AND RIPON,
SECRETARY OF STATE FOR WAR,

DESCRIPTIVE OF THE

HERBERT HOSPITAL AT WOOLWICH,

By DOUGLAS GALTON,

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REPORT to the Right Hon. the EARL DE GREY AND RIPON, Secretary of State for War, descriptive of the HERBERT HOSPITAL at WOOLWICH, by DOUGLAS GALTON, (late Captain Royal Engineers,) Assistant Under Secretary of State for War.

MY LORD,

IN accordance with your Lordship's instructions, dated the 23d August 1864, I have the honour to lay before you the following report descriptive of the Herbert Hospital.

ORIGIN OF THE HOSPITAL.

The Barrack and Hospital Improvement Committee reported in 1858 that the Garrison Hospital at Woolwich was overcrowded; 529 patients were in the building at the time of the inspection, whereas it only contained room for 304, with an average cubic space of 1,200 feet per bed, which was the space which the Committee was directed by its instructions to allot for the sick. The Committee objected that 304 sick were too many to be placed under one roof with a due regard to sanitary requirements, that the building was not adapted for economical administration, and that it was deficient in those ward conveniences which are considered essential in all modern hospitals

Origin of the Hospital.

In the year 1859, when Lord Herbert came into office as Secretary of State for War, the number of sick amounted to 579, and it was necessary to put up marquees in the grounds for the accommodation of those the hospital would not contain. Upon examination it appeared impossible to convert the existing building into a good hospital according to modern principles of construction, and Lord Herbert therefore decided upon constructing a new hospital at Woolwich and converting the then existing hospital into a barrack, wanted at that station for the Military Train.

The regulated amount of accommodation for sick in proportion to the strength of a garrison was then 10 per cent.; this proportion applied to Woolwich required 620 beds, in addition to which a ward of 28 beds was required for prisoners, and a small ward for itch patients.

SELECTION OF SITE.

After a careful examination of the ground round Woolwich, and within about a mile of the Artillery barracks, it was found that only two sites afforded the space and the aspect which were necessary; of these, one was on land belonging to Sir T. Wilson, near the road to Charlton, and upon a gravelly soil, but this the proprietor refused to sell. The other was the site selected. It is situated on the western slope of Shooters Hill, bounded on the north by the Dover Road, and on the east by the road from Woolwich to Eltham.

Selection of Site.

PRINCIPLES LAID DOWN FOR THE DESIGN.

Lord Herbert directed that the new hospital should be designed upon the principles laid down by the Royal Commission on the Sanitary State of the Army, and the Barrack and Hospital Improvement Committee.

Principles laid down for the Design of the Hospital.

It will therefore be convenient in this place to recapitulate the general principles which those bodies enunciated.

There are three classes of buildings to which the term hospital is applied in the army:—

- (a.) Refuges for aged soldiers, such as Chelsea Hospital.
- (b.) Buildings for receiving and disposing of invalid soldiers, chiefly on their return from foreign service, such as the great invaliding establishment at Netley.
- (c.) Military Hospitals, properly so called, whether regimental, consolidated, or general hospitals.

Although the principles of healthy construction to be observed in buildings intended for human occupation are generally the same, yet when these principles come to be applied in practice, they require to be materially modified to suit the class of persons for whose occupation the building is constructed.

It is not necessary, for instance, that a building intended for old people should in every point resemble a building intended for sick, neither is it necessary that a building for the mere temporary reception of invalids, not more than a quarter of whom require medical treatment, and which, moreover, is rarely fully occupied for more than a few days in the year, should embody all the precautions required in a hospital for sick intended to be more or less constantly occupied by men in all stages of disease.

It is not proposed in these remarks to discuss the proper construction either for an aged or invalid establishment. Their object is simply to explain the present position of the question of the construction of hospitals of the third class above mentioned, viz., for the reception of sick.

Public attention in this country was first called to the leading principles of military hospital construction by Sir John Pringle upwards of 100 years ago. The points upon which he specially insisted were the following:

- (a.) Avoiding agglomeration of large numbers of sick.*
- (b.) Giving sufficient cubic space in sick wards.†
- (c.) Abundant ventilation direct from the outer air.‡

Striking illustrations of the advantage of these principles occurred at a subsequent date in the practice of military surgeons, in which it was always found that where from circumstances the refinements of an ordinary hospital, such as hospitals then afforded, could not be provided, but when, on the contrary, medical officers were obliged to treat their sick more or less in the open air, the mortality was much less, and the recoveries more rapid. As might have been expected, the same law was found to exist in the practice of military surgeons abroad, a striking illustration of which occurred in France during the invasions of 1814–15.

At this period sick and wounded soldiers were treated partly in hospitals and partly in unfinished shed buildings without doors or windows, so that the air blew freely through them, and the result was that in the uncomfortable sheds the mortality was one half what it was in the more comfortable hospitals.

In civil life also similar experience has been obtained during the prevalence of epidemics, when it has been found that the sick poor treated under almost any kind of

* “When the disease begins to be frequent the sick should not be sent to one common hospital, at least not in such numbers as to vitiate the air, so as not only to communicate the infection to others, but to keep it up among themselves * * .” “It would be still inadvisable to have but one common hospital, on account of the mortality that naturally ensues upon crowding together such a number of men ill of so putrid a disease * * .” The disease here alluded to is dysentery, but the same principles are applicable to all zymotic diseases and to surgical cases.

† “As to the disposition of hospitals with regard to preserving the purity of the air, the best rule is to admit so few patients into each ward that a person unacquainted with the danger of bad air might imagine there was room to take in double or triple the number.”

‡ “I have generally found those wards the most healthful, when, by broken windows and other wants of repair, the air could not be excluded.”

PRINGLE.—“Observations on the Diseases of the Army,” Part II., Chap. 3.

shelter in the open air have yielded a far higher per-centage of recoveries than the same class of patients treated in workhouses and hospitals.

The benefits of subdivision of sick were proved in a striking manner during the Peninsular campaigns, and more recently in the Crimean war. With reference to the latter experience, it is very questionable whether there are any hospital results, as regards sick and wounded men, at all comparable in their low death-rate to what was obtained in the small detached wooden huts at Balaclava during the latter months of the war. These results become all the more striking if contrasted with the enormous death-rate among British and French sick and wounded agglomerated by thousands in the large, unimproved, unhealthy Turkish buildings near Constantinople used as hospitals.

Principles laid down for the Design of the Hospital.

All the experience obtained since Sir John Pringle's time has proved the correctness of his observations, and wherever hospitals for sick have to be constructed, his three great principles of subdivision, sufficient cubic space, and abundant natural ventilation, must be provided for, unless indeed we are to ignore the results of experience altogether.

These principles were re-affirmed by a large committee of army medical officers appointed by the Director-General of the Army Medical Department at the end of 1856 to report on a proposed hospital for Aldershot. Plans had been prepared at that station for a hospital in separate pavilions, each to contain about 100 sick under one roof, the wards having windows on opposite sides, and the pavilions being connected together by a ground floor corridor for administration.

The Committee, after examining the plans, gave the following opinion on the principle of construction proposed:

"The Board approved unanimously of the general principle proposed to be adopted in the construction of the future building, which consisting of a series of detached structures, each a separate hospital, connected by an open corridor running along the ground story, will effectually prevent anything like an undue accumulation of the miasms unavoidably generated more or less when large numbers of sick are congregated under one roof."

Such was the position of the question at the time the Royal Commission on the Sanitary State of the Army, presided over by the late Lord Herbert, was issued by Lord Panmure in 1857. That Commission carried out an extensive inquiry into the question of hospital construction in this country. It received a paper of evidence from Miss Nightingale containing the results of extensive experience in hospitals of every variety of construction in most European countries in addition to the war hospitals in the east. It furthermore appointed a committee of its own body to examine the more recent improved civil and military hospitals in France and Belgium, and after maturely considering the whole subject the Commission recommended the following principles to be observed in the construction of all future military hospitals:—

- (a.) The cubic space per bed to be 1,200 feet at home, and 1,500 feet in tropical climates.
- (b.) In the construction of new hospitals the adoption of separate pavilions with lateral windows on opposite sides and natural ventilation.
- (c.) The use of Parian cement, or other impervious material, for walls and ceilings.
- (d.) Sufficient provision for warming and lighting the hospital.
- (e.) The introduction of waterclosets and sinks with efficient sewerage by impervious drains free of the buildings; the closets and sinks to be cut off from the hospital by a ventilated lobby.
- (f.) The provision of suitable lavatories, baths, and laundries.
- (g.) The use of stone or fireproof material for staircases and landings instead of wood.
- (h.) The introduction of proper cooking apparatus.

The Barrack and Hospital Improvement Committee* appointed by Lord Panmure on the recommendation of the Royal Commission of 1857 adopted these principles as the basis of its proceedings, and the information obtained by it during a careful examination of 114 military hospitals in the United Kingdom, and of numerous other hospitals both at home and in Paris, served to confirm the accuracy of the principles laid down by the Royal Commission.

In constructing military hospitals there are other things to be attended to besides the sanitary state of the buildings, and not the least important of these are the structural provisions required for administration and discipline. The soldier in hospital is still a soldier under officers, and if he be a prisoner he is under a special guard. Moreover, provision must be made in the construction for carrying out such a system of hospital administration as would be immediately applicable to field service. Again, the hospital service of the British army is essentially regimental during peace, but during war it may at any time become general. Hence the necessity for providing not only improved regimental hospitals, but improved general hospitals, with governor, principal medical officer, orderly service, paymaster, steward, and female nurses with their superintendent, so that all parties may be in the constant practice of the same duties, and have before their eyes the same sanitary conditions and precautions in operation, which they may be called on to put in force each in their several spheres during war.

Sanitary or administrative improvements which exist in fixed hospitals cannot, of course, be transported into the field for service, but the same principles which govern the construction of fixed hospitals can be applied in the field, and applied the more readily when good models exist to be copied.

It became part of the duty of the Barrack and Hospital Improvement Committee to show how the principles, which had been thus arrived at, should be applied in practice.

There are two elements in the construction of a hospital upon which the design must necessarily depend, viz.:—

1st. The shape of the wards.

2d. The number of patients to be allotted to each ward.

These are the portions of the building which govern its shape, and to which all other parts must be made subsidiary.

The Barrack and Hospital Improvement Committee laid down the following as the proportions to be adopted in wards for military hospitals at home:—

(a.) Wards to be 24 feet in width, at least, to insure the requisite facilities for ward-work.

(b.) Wall space for each bed to be not less than 7 feet 3 inches.

(c.) Height of the ward to be 14 feet.

(d.) Superficial area per bed, 87 feet.

(e.) These dimensions give a cubic content per bed of 1,218 feet, which is very nearly that recommended by the Royal Commission for home stations.

In wards beyond a certain length some additional height would be an advantage, but the Committee was obliged to limit itself to the space laid down by the Royal Commission on the Sanitary State of the Army.

The great point to be maintained was the superficial area per bed, which is an element of more importance than mere cubic space.

The next point which had to be decided was the number of beds per ward; and after mature consideration and a careful personal examination of wards of different sizes, and consulting persons conversant with ward administration, it was decided that wards should not contain more than 32 beds as a maximum number. This number, with

* This Committee was composed of the Right Hon. Sidney Herbert, M.P., Dr. Sutherland, Dr. Burrell, and Capt. Douglas Galton, R.E.

improved ward construction, would be safe for the class of cases usually met with in military hospitals, while it is better adapted for efficient and economical oversight than wards of smaller dimensions.

Principles laid down for the Design of the Hospital.

The Committee had next to decide on the best arrangement of beds and windows.

They found two methods of arrangement in use:—

- (a.) Placing the windows at the ends of the wards, with the beds arranged along the dead walls between them.
- (b.) Placing the windows along the sides of the wards, with the beds between the windows.

By the former arrangement as many as seven or eight beds are placed along each wall between the end windows, which are the only means of light and ventilation.

According to the latter method the number of beds between opposite windows can never exceed two.

This latter arrangement was recommended by the Royal Sanitary Commission, and has been adopted in all recent improved hospitals both in this country and abroad.* Its

* A very interesting and important discussion, involving all the leading points in hospital construction, took place in October, November, and December 1864 at the Société de Chirurgie at Paris, in which the most eminent physicians and surgeons attached to the civil and military hospitals of Paris took part.

The following are the conclusions arrived at, which it will be perceived are substantially the same as the principles on which the Herbert Hospital has been built:—

“L'ensemble des conclusions, mis aux voix et adopté, est ainsi conçu:—

“La Société de Chirurgie de Paris voulant contribuer, dans la mesure de ses efforts, à soustraire la pratique de l'art à la funeste influence des complications nosocomiales et à dégager pour l'avenir la responsabilité de la science, a jugé opportun, à propos de la reconstruction de l'Hôtel Dieu, de rappeler ou d'établir les principes suivants:

“I. Un hôpital doit être situé dans un lieu découvert, sur un sol sec et sur un terrain décliné. Ce terrain doit être vaste. Un espace superficiel de 50 mètres carrés par malade (= nearly 500 square feet) représente un minimum qui devra, autant que possible, être dépassé, et qui, d'ailleurs, doit croître *proportionnellement* avec le nombre des malades.

“II. L'atmosphère d'un hôpital sera d'autant plus pure qu'il sera plus éloigné des agglomérations populeuses. On ne devrait conserver au centre des villes que des hôpitaux d'urgence nécessairement restreints et des hôpitaux d'enseignement. Cette mesure de salubrité serait en même temps une mesure d'économie, et permettrait aux grandes villes comme Paris d'installer leurs hôpitaux sur de vastes terrains peu coûteux.

“III. De bonnes dispositions hygiéniques sont faciles à obtenir dans des hôpitaux de 200 à 250 malades. Elles deviennent à-peu-près impossibles à réaliser dans les grandes villes, si on dépasse le double de ce chiffre. Dans ces limites de nombre, les dépenses de toute nature ne sont pas plus élevées que pour des hôpitaux plus peuplés.

“IV. Les éléments de l'atmosphère se mélangeant surtout dans le sens horizontal, il faut combattre par l'espacement les effets de contact et de proximité qui constituent l'encombrement et qui se produisent de malade à malade, de salle à salle, de bâtiment à bâtiment.

“V. Ce n'est pas seulement en augmentant l'espace cubique alloué à chaque malade, mais encore et surtout en augmentant l'espace superficiel, aujourd'hui insuffisant dans nos hôpitaux civils, qu'on luttera efficacement contre les influences contagieuses. Pour des motifs de même ordre, il est indiqué de ne pas multiplier les étages, chacun de ceux-ci engendrant une couche atmosphérique plus ou moins viciée. Au point de vue rigoureux de l'hygiène, on ne devrait jamais superposer plus de deux rangées de malades.

“VI. Ce serait une illusion de croire qu'un large cube d'air à l'intérieur des salles remplace le manque d'espace et d'aération extérieure, de croire qu'une abondante ventilation artificielle supplée à l'une ou à l'autre des conditions précédentes. Rien ne supplée à l'insuffisance ou au défaut de l'aération naturelle.

“VII. Les bâtiments complètement isolés, ayant tous la même orientation, exposés sans aucun obstacle aux rayons du soleil, à l'action de la pluie et des vents, seront disposés sur une seule ligne ou en lignes parallèles, à larges intervalles de 80 à 100 mètres, (= 260 to 330 feet) de manière à obtenir une séparation efficace et une libre et facile aération extérieure.

“VIII. De petites salles de 15 à 20 lits sont faciles à surveiller au point de vue des soins; la gêne réciproque des malades y est moins grande; les chances de contagion directe moindres aussi, l'enlèvement de toutes les impuretés plus rapide. Elles doivent être préférées pour les services ordinaires, sans préjudice de dispositions spéciales à adopter pour certaines catégories de malades qui réclament un plus large espacement et l'isolement dans des chambres séparées.

“IX. Le mobilier des salles ne doit apporter aucun obstacle à la circulation de l'air. Il est nécessaire que les chefs de service aient le droit de faire supprimer les rideaux des lits lorsqu'ils le jugent convenable.

“X. Les salles seront séparées par les paliers et les pièces de service commun. Il serait avantageux que l'une d'elles pût recevoir, pendant le jour et pour les repas, tous les malades qui se lèvent; ce serait une évacuation incomplète, mais quotidienne de la salle.

adoption has been the result of experience ; and a very slight examination of the two systems is sufficient to show that wards with windows on opposite sides, with beds arranged between the windows, afford by far the greatest facilities for ventilating and lighting the ward.

The Barrack and Hospital Improvement Committee decided against the introduction of any general system of warming and ventilation, after a careful examination of the condition of the ward air in hospitals artificially ventilated, and recommended open fire-places in each ward, and windows to open at top and bottom, in addition to flues near the ceiling for carrying off heated air, and inlets for fresh air between the windows. They concurred in this matter with the Royal Commission after an independent inquiry.

After mature consideration the Barrack and Hospital Improvement Committee decided that a hospital pavilion should contain no more than two floors of wards in this climate. In warm climates one floor only of wards is better. In temperate climates more than two floors are unsafe on account of the difficulty of ventilation resulting from the natural tendency of the impure air of the wards below to pass, by means of the staircases, into the upper wards ; and in addition must be considered the inconvenience which arises from the large number of stairs to be ascended by the attendants to reach an upstairs ward on the second floor.

The Barrack and Hospital Improvement Committee further recommended that a General Hospital should have a few small wards for special cases, which should be placed at a sufficient distance from the other wards to prevent the sick being disturbed by noise. Separate accommodation for sick prisoners should likewise be provided. An operation ward, easily accessible from an operating theatre, is also required.

The new regulations require that wards should be set apart for convalescents where practicable. Convalescents require liberty of moving about ; they require change of room or of ward through the day. It is better that they should not sleep, eat, and live in the same room. A proper convalescent day-room is therefore an essential part of every general hospital. It should be a good-sized, light, cheerful, airy, warm room, with a good view from the windows, facility of access to and from the exercising ground, and facility of superintendence.

Hot and cold water should be laid on throughout the hospital ; and each ward should have its hot and cold bath, but every large hospital requires a general bathing establishment of hot, cold, vapour, and medicated baths. These are chiefly useful for convalescents and for patients not confined to bed. They should not be attached to the wards, but accessible from them under cover.

Gas should be used for lighting ; but the ward-lights should be arranged so as to ensure the immediate removal of the products of combustion from the wards.

A general hospital should be provided with a chapel.

According to regulation, every general hospital must have accommodation for the following officers :—

Governor or Commandant.
Principal Medical Officer.
Orderly Medical Officer.
Apothecary or Dispenser.
Purveyor or Steward.

Paymaster or Treasurer.
Chaplain.
Captain of Orderlies.
Superintendent of Nurses.

Under these officers there will be placed—

Assistant Apothecaries.
Female Nurses.
Ward Masters.

Ward Orderlies.
Cooks.
Washers, &c.

“ XI. L'évacuation périodique et régulière des salles et leur repos pendant un temps de plusieurs mois, donnent, dans les hôpitaux militaires français et dans les hôpitaux étrangers, des résultats qui indiquent l'adoption générale de cette mesure, particulièrement impérieuse en temps d'épidémie.

“ XII. Tout sera disposé pour que les matières odorantes et infectantes, déjections, objets de pansement, eaux de lavage, etc., puissent être rapidement détruites ou enlevées, qu'elles ne séjournent jamais à l'intérieur ou à proximité des pièces occupées par les malades, et ne donnent lieu à aucune émanation appréciable.”

The whole staff should be accommodated within the enclosure; but where the area of ground is too small to accommodate the whole staff, or where quarters already exist within a moderate distance, certain officers may be accommodated out of the building, but certain others should always be on the spot. The extent of quarters provided for officers should be upon the scale allowed in barracks, except that none of the superior officers should have fewer than two rooms and servant's accommodation.

Principles laid
down for the
Design of the
Hospital.

The governor should always have an office and clerk's room for administration within the hospital, and his quarters should be within the hospital precincts.

The principal medical officer should have his office within the buildings, but his quarters may be away from it. There should be office accommodation for the Registrar either in or adjoining the principal medical officer's office. There ought to be quarters in the hospital for at least one orderly medical officer. A room for medical officers should be provided for meetings, consultations, &c.; likewise a waiting room for patients, a receiving room, and a surgeon's room.

The dispenser should also have a quarter in the hospital, to be in readiness for night calls.

The purveyor and paymaster should also have offices and clerks' rooms, but not necessarily quarters in the hospital.

The chaplain's quarters may be either within the precincts of the hospital or at a convenient distance.

The captain of orderlies should always be quartered within the administrative part of the hospital, as also the ward masters, and orderlies.

In case of sickness among the orderlies they would be placed in the ordinary wards.

No ward-master, assistant ward master, or orderly should sleep in a sick ward. He should have a bed in the room adjoining the ward, or, in the case of orderlies, in a separate sleeping room, affording 600 cubic feet per man, placed in the administration. This sleeping accommodation should be so placed with regard to the captain of orderlies' quarter, and non-commissioned officers' quarters, that proper order and discipline may be kept up.

The captain of orderlies' quarter should be so placed that he can with facility pass to any part of the hospital when he may be required on emergency.

The superintendent of nurses, and nurses, should be quartered within the administrative part of the hospital, but their quarters should be cut off entirely from the remainder of the administration. They should include linen nurses' and servants' room, store room, small scullery, bath, sink, and two waterclosets, as well as a light and airy room as sick nurses' infirmary, and a small room adjoining for woman attending on sick nurses. The whole of this part of the establishment should have one outer door communicating with the hospital proper.

The clean linen and clean clothing should be kept in rooms supplied with suitable racks and tables within the same outer door. One large room will be sufficient as a clean linen store, but a smaller room for repairing should be provided.

The new medical regulations have fixed the limits within which orderlies' and nurses' accommodation will require to be provided in general hospitals. One orderly is to be provided for every 10 sick, and for every fractional part of 10 sick.

With regard to nurses, the regulation regarding the number to be appointed is as follows: A nurse is to be appointed for every ward, or set of wards, excepting for venereal or convalescent wards, and no nurse is to have charge of fewer than 25 sick. But in a properly constructed hospital a nurse could very well take charge of 60 sick on one floor. A nurse would occupy a nurse's room in every pair of wards wherever possible, and the remaining nurses, including the superintendent's linen nurse, would be accommodated in the administration.

The kitchen may adjoin the administration, provided it be suitably cut off from the quarters, and thoroughly ventilated. It should be sufficient for all the cooking, both of the sick and of the administration. In cases where the officers of the hospital have separate quarters provided apart from the administration, but within the hospital precincts, each officer should be provided with a kitchen.

The block plan of the administrative buildings of a general hospital should be a subject of study by itself, just as the sick accommodation should be; but the sick accommodation must never be made to yield precedence to the arrangements for administration in the block plan; on the contrary, the administrative part must always yield precedence to the sick part, provided any yielding be required.

DESCRIPTION OF THE PLANS, AND EXPLANATION OF THE MANNER IN WHICH THE PRINCIPLES
OF CONSTRUCTION LAID DOWN BY THE ROYAL COMMISSION ON THE SANITARY STATE OF
THE ARMY AND THE BARRACK HOSPITAL IMPROVEMENT COMMITTEE HAVE BEEN APPLIED.

The site occupied by the Herbert Hospital is on the southern slope, and a little below the summit level of a ridge of ground extending from Shooter's Hill along the Dover Road in the direction of Blackheath at an elevation of 235 feet above Trinity high-water mark. The ground has a fall, not only towards the south-west but also towards the west, and as it was of great importance to keep the corridor communication on the same level throughout the building, it was necessary to lower the ground at the north-eastern angle of the site, hence the level of the plateau thus formed is 14 feet below the original surface of the ground at this point, where the Dover Road joins the Eltham Road, but the north-eastern pavilion is 150 feet from that point, and the ward floor on the ground floor is nearly on a level with the part of the Dover Road opposite to the end of the pavilion, and is four feet above the actual level of the ground. The aspect of the site is S.S.W., and the view from it fine and extensive.

Shooter's Hill rises to the north-east and east of the plateau, but the plateau itself is protected from any possibility of wet from the higher ground by a deep drain carried round behind the enclosure wall on the northern and eastern sides, which effectually isolates the plateau on which the hospital stands from all surrounding levels.

The plateau itself is drained by agricultural drains placed in some parts at intervals of 15 feet, and in some parts at much closer intervals. The natural site had a rapid inclination down from east to west. The plateau has, therefore, been formed on two levels shown on Drawings 7 and 8. The ward floors situated on the eastern or upper part of the plateau are raised 4 feet above the level of the plateau; the basements, which afford a minimum height of 8 feet from floor to ceiling, are partially sunk below the level of the plateau. At the western or lower level of the plateau the ward floors on the same level stand considerably, and the basement floor somewhat, above the original ground surface. (Drawing No. 7.) A damp-proof course of glazed perforated brick placed just above the ground level is carried round the whole of the buildings, and a granite surface drain channel is carried close round all the walls. The water from the roofs is led away by close drains into a soft water tank. The surplus rain water from the roofs, and the natural drainage from the site, passes into a watercourse to the south of the site, which carries it into the Ravensbourne River. The foul water drainage on the other hand is carried through a sewer 3 feet high, and 2 feet wide from the north-west angle of the hospital site into the sewers of the town of Woolwich. (Drawing No. 3.)

Drawing No. 1 is a block plan of the hospital and grounds, from which it will be seen that the enclosure devoted to the hospital occupies an area of 523,500 square feet, or about 800 square feet per patient; and the area actually enclosed by the buildings is 74,450 square feet in all, or nearly 115 square feet per patient.

Drawing No. 2 gives a general view of the arrangement of the hospital. The block marked M is termed the administrative block. It contains the entrance gate and porter's lodge, waiting rooms, examination rooms, surgery, offices of the governor, registrar, and paymaster, quarters of the governor, dispensers, orderly medical officers, and captain of orderlies.

The female nurses' quarters are at the western end of the administrative block M, and occupy a portion of the ground floor and first floor. The whole of the upper or second floor is occupied with orderlies' quarters, to which an entrance is provided at the eastern end of the block. (Drawings Nos. 3, 4, and 5.)

The orderlies' dining room is in the basement at the western end under the linen store. A passage in the basement leads from the administrative block by the side of the kitchen to the main portion of the hospital, viz. that occupied by wards. Description of
the Plans.

Behind the centre of the block M, and in the projecting building at the back of pavilion D, is placed the chapel, library, and kitchen. The kitchen and provision stores, &c. are in the basement. On the ground floor of this block close to the entrance gate are the purveyor's and steward's offices, where the provisions will be received from the contractors, weighed, and sent down by a lift to the kitchen.

Behind these, and connected with the central passage of the ward portion of the hospital only, is the library or reading room. On the first floor, above the purveyor's and steward's offices, is the chaplain's quarters, intended for an unmarried chaplain, and the vestry, and above these are rooms for the chaplain's servant; over the library is the chapel, the main entrance to which is from the central staircase of the ward portion of the hospital; an entrance for the chaplain being provided from the vestry. (Drawings Nos. 3, 4, 5, and 6.)

The wards are in the pavilions marked A, B, C, D, E, F, G, and building H.

The following is the division of the accommodation for patients:

Pavilion A contains 3 wards of 32 beds each, and 1 prison ward of 28 beds on the ground floor, with a guard room attached.

„ B contains 4 wards of 32 beds each.

„ C contains 2 wards of 28 beds each.

„ D contains 1 ward of 20 beds on the first floor, 1 day and dining room on the ground floor.

„ E contains 2 wards of 28 beds each.

„ F contains 4 wards of 32 beds each.

„ G contains 4 wards of 32 beds each, and 1 operating ward, and 2 wards of 1 bed each for special cases.

Building H contains 5 separate wards.

There are therefore 15 wards of 32 beds, 5 wards of 28 beds, 1 ward of 20 beds, and 8 wards of 1 bed. This gives 620 beds for the general hospital, besides 28 for the prison ward; in addition to these there is an itch ward, placed in the basement of pavilion F, with an access from the garden terrace only.

The pavilions are all connected by a corridor. The corridor extends the whole length of the building on the basement floor and on the ground floor, but only connects the first floor wards by means of an open terrace. At the western end is the operating theatre I, adjoining the operation ward K. The dead-house and post-mortem room are outside the hospital, on the basement level, marked L.

The pharmacy on the ground floor, and dispensary on the basement, are at the back of pavilion C. The general bath-rooms are in the corresponding block behind pavilion E, and under the bath-rooms is the boiler-room, whence all the hot water of the establishment is supplied.

Under pavilion F is the itch ward, entered only from the outside and furnished with a sulphur bath, an ordinary bath, ablution room, and watercloset, &c. The pack-store is in the basement of pavilion E. The purveyor's stores are in pavilions E, F, G. The latter pavilion also contains a board room for holding medical boards, with access from the outside as well as from the central corridor of the hospital, inside, and a museum and reading-room for the officers of the Army Medical Department.

The main entrance to the hospital enclosure is through the administrative block M. There is also an entrance at the north-west corner of the enclosure, which gives access to the basement, and to what may be considered the back premises of the hospital; and an entrance to the grounds at the south-east angle of the enclosure. (Drawing No. 1.) At each pavilion a staircase connects the ground floor and first floor; but at pavilions D and G only is the staircase carried to the basement floor.

There are airy basements under pavilions A, B, and C, which have been fitted up as general store-rooms for the hospital equipment held ready for field service with an army.

The minimum distance at which adjacent pavilions can be placed apart, in the pavilion system of hospital construction requires a very considerable extent of ground. In the Herbert Hospital where the pavilions are placed end to end the extreme length of the corridor uniting the pavilions is 715 feet, and thus the distance to be travelled between any one place, such as the kitchen, dispensary, or stores, from the most distant ward, is very considerable.

With a view to economise the labour of administration to the utmost, the following plan has been adopted:—

The kitchen, dispensary, coal stores, foul linen receptacles, dust receptacles, &c. have been placed in or adjoining the basement (the kitchen being in the centre), and a corridor in the basement, under the ground floor corridor, which connects the pavilions, runs from end to end of the building. This corridor is on one level, and without steps from end to end; and underneath the corridor is an arched subway in which all the main water pipes and gas pipes are laid so as to be easily accessible at all times. (Drawing No. 7.)

The kitchen communicates directly with this corridor only by means of serving windows near the foot of the staircase in pavilion D. The doors leading into the kitchen are placed in the corridor which leads from the administrative building M to the basement corridor connecting the pavilions. (Drawing No. 3.)

The kitchen has a raised platform along the end occupied by the serving windows to facilitate giving out the diets, and receiving the returned dishes through these windows.

The kitchen is 13 ft. high, 76 ft. long, and 32 ft. wide, and has windows on both sides; it is moreover ventilated by shafts carried up by the side of the chimneys, at one end the chimney from the boiler-house, at the other end the chimney of the cooking apparatus. The scullery, larder, and provision stores are close adjacent to the kitchen.

The whole of the cooking for the patients and hospital staff, excepting the officers, as well as the bread baking for the establishment, is carried out in one compact pannelled iron cooking stove fixed in the centre of the kitchen, with an underground smoke flue communicating with the chimney shaft. This apparatus occupies a floor space of nearly 15 ft. square, and contains the requisite fittings for cooking and baking; is perfectly simple, requires no skilled attendance, and consumes very little fuel.

The apparatus contains 5 iron boilers or caldrons, for meat, soup, beef tea, gruel, puddings, tea, and cocoa, of capacities varying from 20 to 50 gallons. Each boiler is furnished with a hinged and balanced cover fitted steam-tight, a large tap for supplying steam or boiling water, and another for emptying, and each can be converted at pleasure into a steaming pan for potatoes and other vegetables. The apparatus has also two large steam boilers, with the necessary safety valves and taps, and self-acting feed arrangements, as well as two iron pastry ovens, and two hot plates for boiling, stewing, or frying, and two ventilated brick roasting ovens, each capable of holding about 15 joints; these ovens, by closing the valves, become ordinary bread ovens of the capacity of three bushels each. The whole is worked by two furnaces, each furnished with its necessary regulating dampers, soot holes, and ashpit; the anticipated daily consumption of fuel is about $1\frac{1}{4}$ cwt. of coal for each furnace. The object of this double arrangement of all the parts is to enable the apparatus to be worked at half or full power, according to the number of patients, and also to admit of occasional repairs without any interruption to the cooking and baking. The central position of the apparatus in the kitchen affords the advantage of perfect access to every portion, and leaves the kitchen walls clear for dressers and shelves.

Between the cooking stove and the serving windows is fixed a polished iron counter or carving table heated by steam, 20 ft. in length and 3 ft. high, with five pewter dishes let into its top surface, as many scales and weights for the due adjustment of the rations, and underneath it a series of hot closets for plates and dishes, with sliding doors before and behind; the whole is supplied with steam from the cooking apparatus boilers.*

* These fittings have been supplied and erected by the patentees, Messrs. Benham and Sons, of Wigmore Street, Cavendish Square, who also fitted the kitchens of the Victoria Hospital, Netley, and the Royal Marine Infirmary, Woolwich.

The patients' day and dining-room, as has been already mentioned, is in pavilion D, so as to be near the kitchen; it is on the ground floor, and the meals can be carried from the serving windows either up the central staircase or by means of a lift. (Drawing No. 4.)

The orderlies' dining-room is easily accessible from the kitchen by means of a covered corridor, and communication with the quarters of the female nurses is provided for by means of a lift. (Drawings Nos. 3 and 5.)

Lifts, worked by hydraulic power on Sir William Armstrong's principle, are placed at each pavilion communicating between the basement and each ward floor, by means of which it is intended that diets, coals, medicines, &c. shall be passed up from the basements to the wards. There are nine of these hydraulic lifts, and they were supplied from the works of Sir W. Armstrong at Elswick. Each of them is capable of raising a load of 2 cwt. and has a range of lift equal to the height between the basement floor and the upper floor of the building, and all parts of the machinery and pipes were tested to a pressure of 2,500 lbs. per square inch before being delivered. They are made of a size sufficient for raising trays, coals, &c., but are not intended for lifting patients or other persons.

For working these lifts a high-pressure steam engine of 15 horse power, and an accumulator with a ram 7 inches diameter, and a stroke of 12 feet, have also been supplied from the Elswick works. The working pressure on the lifts is about 800 lbs. per square inch. (See Drawings Nos. 20, 21, and 31.)

The arrangements for sending the diets up the lifts are as follow:—The diets are to be placed on trays (specially made to fit the lifts) in the kitchen, and passed through the serving windows to the orderlies, who will place these trays on small waggons to convey them to the foot of the various lifts, which can be set in motion or stopped at will by the attendants on any of the floors with which the lifts communicate.

Opposite the kitchen in the basement of Pavilion D., Drawing No. 3, is a room into which bells ring from all the wards, and in which bell-pulls to each ward floor are provided, so that signals can be made in each direction; also at every lift a speaking tube, with signal whistle, to each floor is provided; and thus the orderlies can communicate from the basement to either of the ward floors, or from the ward floors to the basement, either by means of the bells before mentioned, or by the speaking tubes.

On each ward floor there is a door opening into a shoot, made of glazed earthenware pipe, for foul linen, which can thus be dropped direct into a small well lighted closet in the basement; and similarly on each ward floor there is a shoot, down which it is intended dust shall be swept and taken out in the basement below; both the shoots are carried up to an opening above the roof so as to prevent any smell passing from them to the ward floors. (Drawing No. 12.) The arrangement for enabling the dust to be discharged from the shoot into a cart in the basement is shown in drawing No. 14.

There are only two principal staircases between the basement and the ground floor corridor, one in the centre, the other at the end at which the operating theatre and dead house are situated; this has been done so as to separate as effectually as possible the basement from the portion of the hospital to be occupied by sick. There is, however, also a small staircase which leads from the dressing room, which adjoins the general bath-room at Pavilion E., Drawing No. 4, direct to the pack store in the basement.

The general coal store for the supply of the hospital is shown on Drawing No. 3, between the kitchen and boiler-house. And a coal store for the officers is placed under the administrative block. All the officers' and nurses' rooms and offices are warmed by means of ventilating grates, as described in drawing No. 22, and Appendix No. 2; the fireplaces for warming the wards are described at page 18.

A broad terrace runs along the southern ends of all the pavilions, and a flight of steps leads from the centre of this terrace down to the hospital grounds. The grounds slope towards the south, and are enclosed partly by an open iron railing and partly by a wall. (Drawing No. 1.)

The space allotted to the patients is divided off from the iron railing by means of a light wire fence, so constructed as to be impossible to climb over, and at a distance of about ten feet from the iron railing, to prevent articles from being handed over.

Supply of Gas.

The gas is supplied from the Government Factory in the Royal Arsenal; it is brought by a main to a meter constructed for 600 lights, which is placed in the basement of the projecting building adjacent to pavilion G, whence it passes by a main, laid in the pipe duct under the floor of the basement, to supply the several pavilions and the administrative block M. The outside lights are supplied by a separate branch. The arrangements for shutting off gas from the various parts of the building are as follow:—

The lights in block H can be shut off by means of a stopcock, placed in the subway or pipe duct under the basement corridor; or, with that open, either side of the building can be lighted or the gas turned off at pleasure, by means of stopcocks placed one on either side of the corridor.

Each pavilion is provided with a separate rising main, from the 4" main in the subway or pipe duct, on either side of the corridor; and each rising main has a stopcock on the basement, ground, and first floors, and a branch main with stopcock is provided to the light over the staircase.

There is one rising main for bath and boiler house, and there are two branch mains from the rising main to the chapel and staircase, so that either can be lighted at pleasure.

The kitchen and north end of chapel building, containing the purveyor's offices and chaplain's quarters, are lighted from a separate 2-inch main, with a stopcock in the subway or pipe duct, one in purveyor's office and one in cook's room.

In the front building M there is a separate main with stopcocks to each floor.

Supply of Water.

The water for the Herbert Hospital is supplied by the Kent Waterworks Company.

The water is obtained from wells in the chalk, and pumped into a cistern at a level of about 90 feet above the roof of the hospital.

The water supplied by the Kent Company to the Herbert Hospital Waterworks contains 28·38 grains of solid matter per imperial gallon. The proportions of the principal solid constituents in a gallon of the water are as follow:—

Carbonate of lime	-	-	-	15·95 grains.
Carbonate of magnesia	-	-	-	2·10 "
Sulphate of lime	-	-	-	6·12 "
Chloride of sodium	-	-	-	3·21 "
Organic matter	-	-	-	1·00 "
				28·38

The foregoing analytical results show that the hardness of the water is very considerable; estimated by Dr. Clark's soap test, it amounts to 21° of hardness; it was therefore necessary to submit it to Dr. Clark's softening process before it would be fit for hospital use.*

* By submitting a hard water (*i.e.* a water containing a large quantity of lime and magnesia salts) to treatment with lime either dissolved or suspended in water, the carbonic acid, by which the *carbonates* of lime and magnesia are held dissolved in the water, is fixed by the lime added, with which it forms carbonate of lime. The result of this change is that the earthy carbonates can no longer be held in solution by the water submitted to the treatment, and that the latter is consequently freed from those hardening constituents. Theoretically, therefore, the treatment of a hard water with lime effects a result corresponding to that obtained when the water is boiled; in the latter case heat expels the carbonic acid by which the earthy carbonates are held in solution, in the liming process the carbonic acid is extracted from the water by the lime added.

Other earthy salts than the carbonates are not separated from the water by the liming process, because they are held dissolved by the water without the aid of the carbonic acid. Those salts (*e.g.* the sulphates) constitute, therefore, what is called the permanent hardness of the water.

In carrying out this liming process the water under treatment is mixed with solution of lime (lime water) in such proportion that the amount of lime, added to the hard water, is equivalent to the lime and magnesia contained in the latter in the form of *carbonates*. As the water and lime solution mix the clear liquid becomes cloudy, in consequence of the simultaneous conversion of the lime added into carbonate of lime and separation from the hard water of the earthy carbonates.

The softened water, being allowed to remain at rest until quite clear, deposits a sediment which consists of the carbonates of lime and magnesia originally dissolved in the water and of the carbonate of lime into which the whole of the lime added has been converted.

In the preliminary experiments with the water supplied to the Herbert Hospital Supply of Water, it was found upon examining the water directly after its treatment with lime water (*i.e.* as soon as it had become clear) that its hardness was reduced from 21° to 9° ; when the softened water was left undisturbed for 12 or 24 hours the hardness was reduced to 8° and 7° . This difference is due to the circumstance that a small proportion of the carbonate of lime separates gradually from the water in a crystalline form. As the softening tanks at the Herbert Hospital works are so arranged that the softened water will remain in the depositing tanks at least 12 hours, it may be considered that the average reduction of hardness of the water supplied to the hospital will be from 21° to 8° .

The buildings connected with the water supply are situated on the western side of Shooter's Hill, and distant about one third of a mile in an easterly direction from the hospital. They are shown on drawings Nos. 23 to 30.

The main block contains the two service reservoirs, and two depositing reservoirs. The former, which are 15 feet deep, 35 feet 3 inches long, and 16 feet 6 inches wide, are beneath the surface of the ground upon concrete foundations, and the walls are of brick, and 2 feet 3 inches in thickness, with buttresses at intervals.

Over these are placed the two depositing reservoirs, the floors of which are of brick laid with cement, and resting on concrete. These floors rest on iron girders, which are supported by cast-iron pillars rising from the floors of the service reservoirs. The depositing reservoirs are 11 feet 3 inches deep, 16 feet 6 inches wide, and 35 feet 3 inches long.

In the smaller block are placed the lime-water reservoir, lime house, store-room, workshop, and a boiler for hot water. The lime water reservoir is on about the same level as the depositing reservoirs, and constructed similarly to the service reservoirs, partially below the surface of the ground, resting on a concrete foundation. It is 15 feet deep, 14 feet 6 inches wide, and 16 feet 9 inches long.

The interior walls of all these reservoirs are rendered with Portland cement.

The process of softening the water, is carried out at these works in the following manner:—

The first preparation of the lime, by mixing with it sufficient hot water to make cream of lime, takes place in a small iron tank in a room over the storehouse. Thence this cream of lime is conveyed by a pipe to the lime water reservoir, when a large volume of water is added to it, and thoroughly mixed by two revolving "agitators" fixed in the centre of the reservoir.

When sufficiently mixed, the lime water is conducted by a pipe to one of the depositing reservoirs, when the necessary proportion of water is added to it. Here it remains until a sufficient time has elapsed to allow of the deposition of the earthy constituents of the water, and then the softened water is drawn off from the upper part into the service reservoir, and is ready for supply to the hospital.

A small quantity of water containing the deposited sediment is allowed to remain at the bottom of the depositing reservoir, to be passed away by a pipe into the whiting pits outside the building.

The service reservoirs into which the softened water is thus introduced are each capable of containing 47,000 gallons, and the water passes from those reservoirs through 6-inch iron socket pipes so as to afford a constant high-pressure supply to the hospital.

A 4-inch main supply pipe, for the internal supply of the building, is carried along the pipe duct under the basement floor of the hospital, and similar mains are carried

The proportion of lime water to be added to a hard water is of course determined by the quantity of earthy carbonates shown by analysis to exist in the water; but it is also controlled by the application of a simple test to the mixture during the liming process. This test enables the proportion of lime water added to be regulated according as the composition of the water (*i.e.* the proportion of carbonates to be separated) fluctuates.

The lime water used is prepared either from the water supplied or from some of the softened water. Slaked lime is converted into a cream, with water, and is then mixed in slight excess with a large volume of water; the mixture is well stirred for some time, and afterwards left at rest until the excess of lime has deposited.

Supply of Water. outside the building on each side for the supply of 4 fire-cocks and 13 stand-pipes which are prepared for brigade hose.

From the main inside the building tubing of various sizes conducts the water to cisterns placed for the supply of the lavatories, baths, urinals, sinks, &c.

Near the end of each ward, both on the ground floor corridor and on the floor above, and in each ward lavatory, fire-cocks are placed connected with the mains.

Hot-water Service. The hot-water* supply for warming purposes is provided by means of two wrought-iron cylindrical boilers 17 feet long and 4 feet in diameter, with the necessary fittings and self-acting apparatus for prevention of smoke.

Circulating 6-inch pipes lead from the boilers along the corridor within a chamber formed under the basement floor, and communicate with coils, two of which are placed in each section of the corridor between the pavilions. Air ducts with regulating valves and gratings are provided for the delivery into the corridor of the air warmed by the coils. Coils of 4-inch pipes are also placed in the lavatories, in the waterclosets, and in the lobbies which divide these appurtenances from the wards (Drawings No. 10 and 11). Fresh air is conducted to these coils, to be warmed in cold weather before admission into these places. A coil of 2-inch pipe is placed in each ward scullery to warm the closet in which the clean linen is kept. All the main pipes are covered with three thicknesses of stout hair felt, except where they are protected by brickwork.

The chapel, ward staircases, female nurses' sleeping rooms, officers' museum and library, and the hospital library are warmed by a similar arrangement.

For the hot-water service for baths, ablution, and general purposes two boilers of the same size as those above described are provided, whence a 6-inch flange pipe is conducted along the entire length of the building. Each boiler is connected with two flow and two return pipes, each leading to a 10-inch main, fitted with branch outlets for the 6-inch circulating pipes, and with regulating valves so arranged that either one or both boilers may be used. A counter circulation in 1½-inch wrought-iron tubing leads from the 6-inch mains through each of the ward lavatories, sculleries, baths, and sinks. Stop-cocks are provided by means of which these hot-water services can be cut off from any part of the building as may be required.

Washing Establishment.

The wash-house and laundry is separate from the hospital, and placed on the north side of the Dover Road; it contains a 4-horse power engine, with boiler, &c., for working the washing, wringing machines, and mangles. The laundry contains the necessary washing and steaming tubs, drying closet, and an ironing-stove. The general arrangements are shown in drawings Nos. 31 and 32.

The engines and accumulator for working the lifts are placed in the same building.

It has been mentioned that the rain water from the hospital roofs is carried to a tank at the western end of the hospital. This tank is capable of holding 58,000 gallons, and the soft water from it is used in the washing establishment.

Cost.

The specification for the hospital, showing all the details of construction, is printed in the Appendix No. 3.

The cost of the Herbert Hospital is as follows:

					£
Purchase of land	-	-	-	-	6,394
Buildings appertaining to the hospital proper, including the washing establishment	-	-	-	-	209,139
Reservoirs for softening water	-	-	-	-	5,351
Total cost	-	-	-	-	<u>£ 220,884</u>

* The whole of the hot-water service was arranged by Messrs. Jeakes and Comp., of 51, Great Russell Street, Bloomsbury.

Such being a general outline of the building it is necessary now to show in what manner effect has been given to the principles laid down by the Royal Commission on the Sanitary State of the Army, and by the Barrack and Hospital Improvement Committee, and to explain the reasons for the various arrangements which have been adopted.

Explanation of the Manner in which the Sanitary Principles laid down have been applied.

The design for a hospital is necessarily dependent upon the proportions and form selected for the wards and their appurtenances; it is desirable therefore in the first place to direct attention to this part of the hospital.

The system of ward construction, adopted in all the best existing hospitals, and required by the Barrack and Hospital Improvement Committee, viz., placing the windows along the sides of the wards, with the beds between the windows, produces a large amount of outside wall, and both with a view to economize warmth and to ensure dryness, it was decided to build the walls with an air space in the centre. (Drawing No. 9.)

In this method of construction the thickness of brickwork in the wall is the same as it would be in a solid wall, the air space being additional. The sketch in drawing No. 11 shows the arrangement adopted. The inner portion of the wall, 14 inches thick, is built of stock bricks; the bond is made with "Jennings'" vitrified bonding bricks placed in alternate courses; the air space is three inches wide, and the outer portion of the wall is of stock bricks faced with white Suffolk bricks. The object of using white bricks for facing is to make the walls of the pavilions, which are looked on to from the ward windows, as cheerful as possible.

In the best existing examples of hospital construction there is one window for every two beds, and the Committee recommended this proportion for the new military hospitals. The proportion of superficial window space per bed thus afforded is about 24 feet, including a large window at the end of the ward. In the Lariboisière Hospital at Paris it is 30 feet; in the great military hospital at Vincennes it is 24 feet, and in the larger front wards of Netley Hospital, devoted to the treatment of sick as distinguished from invalids, it is 31 feet.*

The amount of window space in the Herbert Hospital which is the same as that in the other new military hospitals is however sufficient. The large window at the free end of the ward was adopted from some of our best civil hospitals, in which the end window has been found of great use in ventilating the wards, especially at night. All the side windows are hung at top and bottom in the usual way, on account of the much greater facility for ventilation afforded than by the French casement system. The end window which is circular-headed has the lower part constructed as a French casement; the circular head is arranged to open by falling inwards so as to throw the incoming air towards the ceiling. Plate glass three eighths of an inch thick is used in all the ward windows in order to economize warmth.

The ward floors are of oak, which forms the healthiest kind of floor. They are laid on iron joists and concrete, with a smooth cement surface on the top, on Fox and Barrett's principle, partly with the view of making them fire-proof, partly to prevent sound being transmitted through, and partly to ensure that no impure air shall pass from the lower to the upper ward through the floor. Upon the iron joists are sleepers running lengthways of the floor, and small timbers of 2 in. by 2 in. across them. The boarding is of oak battens, tongued, closely laid and wrought to a smooth surface. The space between the oak floor and the concrete is ventilated through holes drilled in an oak sill 3 inches in radius, quarter round, placed as a skirting all round the wall in order to prevent the beds from being pushed up close to the wall; the holes drilled in the skirting allow of a current of air passing between the oak floor and the concrete. (Drawing No. 16.) These floors have been carefully oiled and beeswaxed, so as to be

* In the nine-bed wards at Netley Hospital opening out of the corridor, and mainly occupied by men not sick, the total surface of glass receiving light from the corridor and from the open air is $33\frac{1}{2}$ square feet per bed. The area admitting light direct from the open air, exclusive of the light from the corridor, is $16\frac{1}{2}$ square feet per bed. In New St. Thomas' Hospital, besides the large end windows, every bed will have a window, thereby giving a much larger glass area than that of any military hospital.

Explanation of the Manner in which the Sanitary Principles laid down have been applied.

maintained clean by rubbing, without the necessity of frequent washing, which renders the wards damp.

The ward walls are lined with Parian cement, in conformity with the recommendation of the Royal Commission. The object of this is to improve the ward atmosphere, which in hospitals with plastered walls becomes foul after a time because the porous plaster absorbs organic matter. The usual remedy for this is limewashing and frequent scraping of the walls, but it is anticipated that the Parian cement will not absorb organic matter, and that simple washing with soap and water will enable the wards to be continuously used.

The wards are lighted at night by means of gas. The lights are enclosed in glass globes suspended from the ceilings by tubes, through which the whole of the products of combustion are removed into the open air by suitable flues; these flues are so arranged as to be easily cleaned out periodically. (Drawing No. 14.) In the upper wards, where it has been necessary to lay the gas pipes for the lower ward under the floor, the oak battens are screwed down so as to be easily taken up when required.

The means of ward ventilation which have been adopted in the Herbert Hospital are very simple. In weather when fires are not needed ventilation is effected first and mainly by the windows, and, in addition, by Sherringham's* ventilators introduced between the windows on each side of the ward close to the ceiling, and by a shaft at each angle of the ward carried up above the roof for the escape of the foul air. (Drawing No. 17.) The united area of these shafts affords from 10 to 14 square inches of area per patient, according to their height, *i.e.*, according to whether they are for the wards on the ground floor or first floor; they are terminated in the ward by louvres, which in the event of a down draught would throw the air up towards the ceiling.

In weather which requires fires an important means of admitting fresh air is provided by specially constructed open fireplaces placed in the middle of the wards. The draught of the open fireplace removes a large quantity of air from near the floor of the ward, where it is coldest. The air thus removed, as well as that removed by the shafts, is replaced by fresh air previously warmed by contact with the chimney-flue and sides of the fireplace. These grates warm the wards partly by direct radiation, and partly by warming slightly a large mass of fresh air taken, not from the ward, but from the outer atmosphere. Their essential characteristic is the introduction of fresh warmed air from without, and they are placed in the central line of the ward in order to distribute the fresh warmed air more equally than if placed at the side, and also for the purpose of obtaining a larger amount of heating surface to warm the fresh air which is admitted along the side of the horizontal flue. Drawing No. 15 shows the general arrangement of these stoves. The fire stands in an iron cradle fitted to the fire-clay back and side, and a current of air is brought through the fire-clay, where it becomes heated, on to the top of the fire to assist in the combustion of the gases and the prevention of smoke. The top of the stove is coved inside to lead the smoke easily into the chimney, which runs horizontally under the floor to the side wall of the ward, and is placed in a trough along which air direct from the outer air is brought, so as to pass in contact with the flue, and thus to extract heat from it before it passes into the ward; these inlets for fresh warmed air are arranged to afford an area of from 8 to 10 square inches per bed. These horizontal flues were originally designed to be of fire-clay, but their size as designed was not sufficient to cause the stove to draw well, and they were consequently enlarged so as to give an area of 110 square inches. It was however found necessary, in order to preserve the requisite area in the trough for fresh air, to make the flues of iron instead of fire-clay; and to prevent the air being overheated by the iron an outer casing of iron was put over them, and the interval filled with a thin coat of fire-clay; the hearth, which is of iron, has been similarly treated. Arrangements are made, in the floor by means of panels, in the trough, and in the flues, to enable the trough to be easily opened along its whole length, and the flue to be lifted out so that the

* The mode of action of Sherringham's ventilators is found to depend very much on the direction of the wind: thus they will occasionally act as outlets for impure air as well as inlets for fresh air.

air passage may be easily cleaned periodically. (Drawings Nos. 15 and 16.) The horizontal flue is swept by means of an opening at its end close to the stove in the ward, through which a brush can be pushed so as to force the soot into the vertical flue with which it communicates in the side wall, and which is carried from the top to the bottom of the building; at the bottom of the vertical flue, and outside the building, is a soot door, by means of which the soot can be removed; the outer wall close to the soot door is covered with glass to prevent the soot from dirtying the wall. In order to prevent any chance of smoke when a fire is first lighted, a spare flue is provided, close to the ward flue, from a fire in the basement, and by means of which the vertical ward flue can be heated and a draught obtained. This can be used if wanted to assist ventilation in summer, by extracting air through the ward fireplaces. The separate wards, the operation ward, the wards for special cases, and the itch ward are ventilated by means of extracting flues placed near the ceiling at the side of the chimney breast, by Sherringham's ventilators for admitting fresh cold air, and by the ventilating grate of a pattern similar to that adopted for barracks for warming and admitting fresh warmed air. These grates are shown in drawing No. 22, and described in Appendix No. 2.

Explanation of the Manner in which the Sanitary Principles laid down have been applied.

The ventilating arrangements have been devised with the view of taking advantage of that difference of temperature between the air outside and within inhabited apartments which almost uniformly exists in this climate. When this difference is small, or when the outer air is unusually still, the medical officer must supply the necessary correction by a proper use of the windows.

At the free end of each ward and on each side of the end window is a small square room. (Drawings Nos. 9 and 10.)

One of these rooms contains a glazed terra cotta bath, a sink at which the portable baths can be easily filled and emptied, an urinal, and a range of white earthenware lavatory basins sunk in marble slabs, and having hot and cold water laid on; the marble has been adopted because it is whiter than slate, and therefore shows dirt more easily. Drawings Nos. 12 and 13. The hot water supply is furnished from the central boilers mentioned at page 16.

In the other small room are placed the waterclosets and a sink for ward slops. These are separated from the ward by a ventilated lobby, with the ventilating windows placed at right angles to each other; an arrangement by which the wind, in whatever direction it blows outside, carries the effluvia away from the ward, a result which can be secured by no other existing arrangement.

In addition to the ventilation afforded by the windows which open at the top and bottom, each of these compartments has shafts for the escape of foul air, and Sherringham's ventilators for admission of fresh air, and they, as well as the lobby between the compartment and the ward, are each warmed by a coil of hot-water pipes (Drawing No. 11), round which air direct from the outer air is admitted, so that each compartment and each lobby has its own independent supply of fresh warmed air in winter, and thus every precaution is taken to prevent the smell from the waterclosets and sinks being drawn into the wards in cold weather.

The waste pipes which convey away the refuse are all trapped just under the outlet from the basin, bath, urinal, or sink with which they are connected; they pass into a waste soil pipe, which is carried up to above the roof, and open at the top, so as to allow of an outlet for the gases displaced in the pipe when water is suddenly thrown into it from sinks or waterclosets; the waste pipe is led into a trap at the bottom to cut it off from the drain outside the building, so that every precaution has been taken to prevent any drain smell from entering the building.

All the waste pipes are carried directly out of the building, and no drains pass under any part of it.

The sinks for slops from the wards and the waterclosets throughout the buildings are constructed on the valve principle by Mr. Jennings. The advantage of these

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closets is, that the whole contents are emptied rapidly and thoroughly, and a fixed quantity of fresh water flows in to replace that removed by emptying, however short may be the time during which the valve for emptying is raised. The seats of the waterclosets are of oak, as being less absorbent than deal, and the sides are of enamelled slate. The sink has a lead safe all round, and sloped into it, and enamelled slate at the sides; it is also supplied with a water tap for washing out the utensils emptied into it. Urinals are provided in the ablution room; of these two forms are adopted. One is on a principle somewhat similar to that of Jennings' waterclosets, that is to say, the pan holds a fixed quantity of water, and any excess passes into the drain through an overflow pipe: this water is emptied periodically by raising a valve, so arranged as to allow a fixed quantity to pour in after the pan has been emptied. The other form, which has been more generally adopted as being more economical of water, has a treadle which admits the water only while the man using it stands at the urinal. These urinals are fitted with slate floors and sides.

The ablution room has also hot and cold water taps for conveniently filling the portable baths which are on rollers, and under these taps, on the level of the floor, is a sink for conveniently emptying the baths.

The arrangement of these various fittings, and the method of ventilating these rooms and adjacent lobbies, are shown in drawings Nos. 10, 11, 12, 13.

The amount of light supplied to the lavatories and waterclosets is very considerable; each watercloset has a window, and the lobbies are well lighted in addition. Light coloured surfaces have also been adopted wherever possible. The main object being to ensure that if these places are made receptacles for dirt or rubbish, the inspecting surgeon or other officer shall at once detect it.

Each ward has its own administrative offices placed at the entrance. These offices consist of a nurse's room, containing a bed, and having a small inspection window into the ward, and a ward scullery containing a small range for warming drinks, &c., a closet warmed by a coil of hot-water pipes for airing ward linen, and a small sink of fire-clay glazed white to ensure its being kept perfectly clean, for washing tea-cups, plates, &c., the waste-pipe from which is carefully guarded in the manner already described. (Drawings Nos. 9 and 13.)

One great advantage of the pavilion method of construction is, that it suits itself readily to any form of site. It is very advisable, however, wherever it can be accomplished, that the axis of the pavilions should run north and south. The advantage of this arrangement is, that the sun shines alternately on each side of the pavilion during the day, and that the early morning sun enters the wards. During the heat of the day the side windows are not exposed to the sun. The axis of the pavilions of the Herbert Hospital lies N.N.E. and S.S.W., as has been already mentioned.

A regimental hospital can be constructed of one pavilion only, or of two pavilions joined end to end, and such a double pavilion should not contain more than 100 to 130 beds, with two floors of wards. The double pavilions are connected in the centre by a staircase and lobby which should be carefully ventilated by windows, and warmed in winter so as to prevent any probability of the impure air from one ward passing into the other wards in the same double pavilion.

In the new military hospitals hitherto constructed the stairs and landings are of stone, in conformity with the recommendation of the Royal Commission; but in the Herbert Hospital the ward, and ward passage, and lobby floors have been made fire-proof, and, except the central staircase, which is of stone, the staircases have been made of iron (as shown in Drawings Nos. 18 and 19), with oak treads to the steps, as it is considered that wood when it can be combined with a fire-proof arrangement is better for the sick to walk on. All the staircases for the ward buildings are specially designed for ease of ascent. The risers are rather more than $4\frac{5}{8}$ in. in height, and the treads $12\frac{3}{4}$ in. wide with $1\frac{1}{4}$ in. nosings. The width of the stairs is 5 feet, except in the central pavilion where it is 8 feet in the first flight, and 5 ft. 9 in. in the return flights.

General hospitals require to be built of a number of separate pavilions independent of each other, but connected for administrative purposes.

Each pavilion, so far as the patients are concerned, should be a separate hospital, and the administrative connection between them should be kept up in such a way as to prevent interchange of the air from the wards in the different pavilions.

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In arranging the pavilions or blocks, if these are to be placed parallel to each other, the distance between the blocks must be such as to afford a fair share of light in the lower wards, and to allow the sunshine to fall on each side of the lower wards for at least a couple of hours in winter. In this climate a distance of about twice the height of the pavilion measured from the lower ward floor to the eaves of the roof will secure this; but the light in the lower ward is very much assisted by using a light coloured brick for the outside of the ward walls of the hospital.

The arrangement of pavilions to be adopted will depend of course upon the nature of the ground; in the Lariboisière Hospital the pavilions contain one large and one small ward on each of three floors, and are at right angles to a corridor which runs on the ground floor round three sides of a square, which forms an exercising ground.

In the case of the Herbert Hospital some of the wards are placed in double pavilions and some in single pavilions, and the pavilions are ranged at right angles to a corridor running in a straight line from east to west; this method was adopted in the first instance as the best way to occupy the ground, which was the only site which could be obtained within reasonable distance of the garrison, but the facility for administration which this plan affords is very great.

It is essential that there should be as free a circulation of air as possible between the pavilions, and that the spaces between the pavilions on the northern side should obtain as much sunshine as possible. In order to secure this object in the Herbert Hospital the corridor joining the wards is made like a glazed arcade, and connects the ground floor only; the upper wards being reached by staircases in each pavilion; besides which the three centre pavilions are single pavilions running out towards the south, and leaving a large area on the north free from wards, and occupied only by the block containing the kitchen in the basement, the library on the ground floor, and the chapel on the first floor, and by the small projecting buildings behind pavilions C and E containing the dispensary and baths. The roof of the corridor along this space, that is between pavilions B and F, is carried on the level of the upper ward floors, so that patients occupying the upper wards could be wheeled out on to the terrace roof in their beds in summer into the sunshine, Drawing No. 14; but between the double pavilions A and B, and F and G, at each end, the corridor is only nine feet high, so that it shall intercept the sun's rays as little as possible from the two courts between these pavilions on the north side. (Drawing No. 7.)

Each pavilion has thus its own staircase; this is warmed by hot-water coils, and ventilated by windows in the upper part. Each staircase on the ground floor is cut off from the adjacent corridor by swing doors, and the portion of corridor between adjacent pavilions is warmed by hot-water coils and ventilated by fresh air admitted through the coils; thus the ventilation of the corridor effectually cuts off the possibility of impure air passing from one pavilion to the other, a cheerful and warm exercising place is provided for the patients in winter, and the chance of draught in the corridor is diminished.

The patients' day and dining room and library are in pavilion D on the ground floor, opposite to each other; the latter is over the kitchen. Above the library, on the first floor, is the chapel, calculated to accommodate 300 convalescents. The main entrance to the chapel is from the principal staircase in pavilion D; an entrance for the chaplain is provided at the other end through the vestry. The chapel and library are warmed by hot-water pipes. There is an entrance to the garden terrace on the south front of the hospital, from the south end of the dining room, and there are also entrances to the garden for patients between pavilions AB, BC, CD, as well as an entrance from building H.

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The principle of separating the administrative part of the building from the sick wards has been carried out as far as possible; this has been done for the double purpose of protecting the sick from unnecessary noise, and of keeping the ward atmosphere pure. And one of the most important features in the construction of the Herbert Hospital is the arrangement which has been adopted for securing economical administration.

In explaining how the administrative portions of the building have been arranged, it is necessary to state briefly the method in which the Herbert Hospital will be administered, in order to show the relation which exists between the structure of the building and its current use.

In a preceding page will be found a list of the officers employed in administering the hospital; their duties are laid down in Section VIII. of the new medical regulations. These regulations, though more especially intended for general hospitals during war, admit of being adapted to home circumstances in such a manner that they can be expanded for field service without adding new duties.

The governor is an officer specially selected by the Secretary of State for War. He is specially commissioned, but placed under the authority of the officer commanding the forces. The governor has supreme control over all matters connected with the condition, efficiency, discipline, the providing of supplies, of medicines, the hiring of labour, transport, equipments, or materials; when necessary, the execution of repairs and sanitary improvements, maintaining a sufficient supply of stores and equipments for present use, or to meet prospective requirements by requisition or purchase. He is responsible for the finance and expenditure of the hospital, and for the proper administration of the different departments. He can suspend officers, subject, however, to appeal to the Secretary of State for War, except in the case of the medical officers and the superintendent of nurses, in whose cases appeals lie to the Director-General of the Army Medical Department and Superintendent General of nurses respectively. In order to keep up the general superintendence required, the governor is provided with an office and clerk's room (M and N, Drawing No. 4, administrative block,) overlooking the main court of the hospital, and between 50 and 60 yards distant from the centre of the hospital. His quarters, consisting of six rooms, are on the floor above, and have a similar outlook. He is also provided with a servant's room or kitchen in the basement. The office and quarters are connected with the hospital by an iron corridor with a glass roof.

The offices allotted to the various heads of departments under the governor are close to his own office; and it is of importance to remark that none of these departments has authority over, or right to interfere with, any other in disciplinary matters. Every requisition or complaint must come up to the governor, and from the governor the decision goes direct to the department concerned.

The following are the departments under the governor:—

1. The *Medical Department*, administered by the principal medical officer, who is appointed and removable by the director general, and acting under his directions. The principal medical officer has control over every thing belonging to the medical care and treatment of sick and wounded men, and issues all necessary instructions on those duties to medical officers, apothecary, dispensers, dressers, &c. He appoints orderly medical officers; he superintends the treatment of the sick and wounded; he examines the quality and cooking of the diets; also the clothing, bedding, and comfort of the sick; he is responsible for the state of supplies, medicines, medical comforts, medical and surgical appliances; he makes out the necessary lists and requisitions, and sends them to the governor. The principal medical officer reports all defects or neglect of duty to the governor. The principal medical officer has an office and clerk's room (O, P, Drawing No. 4, administrative block). Quarters are not provided for him, as he is not required by regulation to reside within the precincts of the hospital.

An orderly medical officer must always reside within the precincts, and his quarter is on the first floor of the administrative block M, N, O, Drawing No. 5. The daily

medical attendance will of course be carried on by surgeons of brigades and batteries, as at present. No quarters have as yet been provided for these officers, who live at Woolwich, where much of their regimental duty has to be performed, and where there is accommodation for receiving the patients before sending them to the Herbert Hospital.

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Patients will be admitted to the hospital on the right hand side, ground floor, of the administrative block, where there is a suitable waiting room, examination room, and surgeons' room (C, D, E, Drawing No. 4), connected by a covered glass verandah with the general bath room, 50 or 60 yards distant, and with the ground floor of the hospital.

Under the principal medical officer is a registrar who keeps the statistical records of the hospital, and is provided with a room, R, properly fitted up for the purpose.

The apothecary or dispenser is responsible for the care of medical stores and the correct dispensing of prescriptions. He is provided with quarters, J, K, L, first floor, administrative block. (Drawing No. 5.)

The pharmacy, drug store, and dispensary are within about 50 yards of his rooms, and occupy the small block behind pavilion C. (Drawings 3 and 4.)

There is power to appoint a special sanitary officer to attend to the sanitary state of the hospital, but this officer would only be necessary during war.

2. The *Purveyor* or *Steward* receives his instructions from the governor, to whom he is solely responsible. He provides all equipments, stores, diets, medical comforts, supplies, furniture, and utensils, according to the fixed scales. He may, if necessary, make contracts to supply the hospital, and he makes out, for the use of the governor, any estimates or lists of articles of supply which the governor may call for. He has the charge of all hospital stores, except medicines; he keeps the books of the store and supply department, and has the custody of soldiers' clothing and property while in hospital.

His office where he receives the contractors' supplies is on the ground floor (a, b, c) of the centre pavilion, close to the main entrance through the administrative block. There is a lift from the steward's office to the kitchen, so that all provisions after having been received at the entrance of the hospital and examined and weighed by the steward, can be at once passed to the kitchen. By this arrangement it will be unnecessary for contractors' servants to enter the interior of the hospital. (Drawing No. 4.)

3. *Paymaster*. Some of the duties of this officer are specially adapted for field service. Under such circumstances he would receive, keep, and pay the funds necessary for the hospital expenditure, subjecting the accounts of the purveyor to a preliminary audit. At all times he will keep the accounts, and be paymaster of sick or convalescents, of officers of the establishment, orderlies, nurses, cooks, &c.

The paymaster's office is at X, Y, ground floor, administrative block. (Drawing No. 4.)

4. The *Chaplain* attends to the religious instruction of the sick. His quarter is close to the chapel, with which it communicates through the vestry. (Drawings Nos. 5, 6.)

5. *Captain of Orderlies*, who is head over the entire orderly service of the hospital. According to recent arrangements orderlies are selected by commanding and medical officers, put on probation, and, if found fit, are trained partly in regiments, partly at Netley, and are drafted into the army hospital corps, of which the head-quarters are there. These orderlies are divided into two branches:—

1st. The Medical, which supplies the usual ward attendance on the sick.

2nd. The purveyor's branch which supplies storekeepers, cooks, washers, servants, &c.

The usual allotment is one orderly to ten sick, with non-commissioned officers (ward-masters), besides the non-commissioned officers and orderlies of the purveyor's department. The captain of orderlies is responsible for the discipline and efficiency of the whole of this establishment. He distributes their duties, attends to the discipline of the wards, makes out lists of ward and kitchen equipments, &c., and is responsible for all ward furniture, when issued to him. He sees to the distribution of the diets, to the repairs, lighting, ventilation, warming, and cleanliness of the wards; he looks after the cooking apparatus, fuel, and cooking; he pays wages to his staff; he receives from the

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ward-masters the diet roll of each ward, and sees that the rolls are complied with; he attends also to the washing, and provides clean linen and bedding for the sick.

The captain of orderlies must reside within the hospital precincts, and has quarters assigned him on the ground floor of the administrative block S, T, U, which has an entrance into the staircase leading to the orderlies' rooms. (Drawing No. 4.)

The ward-masters attend to the discipline of the wards, and to the efficiency of the orderly service by day and by night, under the direction of the captain of orderlies.

The number of ward-masters depends on the construction and arrangement of the hospital. A smaller number will be required for the Herbert Hospital than would suffice for most hospitals, on account of the great facility of supervision, for the ward-master, in going his rounds, can in the larger pavilions see no fewer than 64 patients, with the orderlies in attendance on them, from one single position.

The orderlies are quartered in barrack rooms occupying the whole of the second floor of the administrative block. (Drawing No. 6.) Their quarters contain an ablution-room, bath-rooms, waterclosets, and night urinals. They are designed to afford 600 cubic feet of space for every occupant, and are ventilated according to the principle of ventilating soldiers' barrack-rooms required by the Barrack and Hospital Improvement Committee; that is to say, they are furnished with extracting flues for foul air, inlets direct from the open air placed near the ceiling for admitting fresh cold air, and they are provided with the ventilating grates described in drawing No. 22 and Appendix No. 2. They have their own staircase, (V, Drawing No. 4.) connecting these rooms with the covered verandah leading to the hospital. Opening into this staircase on the ground-floor are quarters for a serjeant-major, and at the top of the staircase are quarters for non-commissioned officers, the arrangements being such as to preserve discipline. The staircase is continued down to the basement and an underground passage leads from the centre of the basement of the administrative block to the basement corridor of the main hospital building, so as to give access under cover to the orderlies' dining-room, and to the orderlies' barrack-rooms as well as to the officers' quarters and offices. It is intended that the orderlies on duty at the time of dinner should dine in the ward sculleries. The other orderlies will dine in their own dining room, which is in the basement at the western end of the block (M, Drawing No. 3.) easily accessible from the kitchen by means of the passage before mentioned. As will be seen from the sections (Drawings 7 and 8), the general enclosure of the hospital to the north of the ward portion is on two levels or plateaus. The eastern plateau, which extends to the western end of the building M, is on a level of 4 feet below the ward floors, the adjacent portion of the western plateau being about 8 feet below that level, and the basement story for this portion is therefore above the ground level; an opening from the orderlies' dining room, on its western side, leads directly on to the latter (or lower) plateau.

6. *The Superintendent of Female Nurses.*—The Herbert Hospital is to be nursed by female nurses under a superintendent. The superintendent takes charge of the clean linen and mending; she apportions and superintends the duties of the nurses in accordance with a special code of regulations drawn up for her guidance. The nurses are intended to occupy the position of ward-sisters in civil hospitals. The nurse in charge of a ward attends the medical officer on his visits, receives, and sees to the carrying out of, or personally carries out, his orders regarding the administration of medicine, medical comforts, and the preparation of sago, arrowroot, and similar articles. The ward orderlies are bound by regulation to obey the nurse in carrying out the orders of the medical officer, she reporting, either directly or indirectly, any disobedience or breach of discipline to the orderlies' superior officers.

It is highly probable that in practice one ward "sister" will be found sufficient for two wards on the same floor, in all 64 beds.

The accommodation provided for the nursing establishment consists of two parts:—viz., 1st., the quarters for the nurses, including the clean linen store; and 2ndly, the accommodation adjacent to the wards necessary for ward administration.

The nurses quarters occupy the whole of the first floor on the west side of the administrative block. On this floor there are rooms for the superintendent of nurses; her office, nine small separate rooms for nurses, kitchen, accommodation for sick nurses, &c. (S to Y, drawing No. 5.) They have an entrance to the covered arcade which leads to the ward portion of the hospital, by the side of the bath-room.

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On the ground floor (drawing No. 4, F, H, I) are situated the clean linen store of the hospital, where all the clean linen is received, mended in an adjacent room, stored under the charge of the superintendent of nurses, and given out for ward use. The whole of this portion of the administrative block is within its own door.

Coal and other articles can be supplied to the nurses' quarters by means of a lift.

To ensure efficient ward administration each ward has its separate nurse's room and separate scullery. The scullery is intended amongst other things for washing, cleaning, and keeping the ward crockery, and other apparatus. For this purpose it is supplied with a glazed earthenware sink, with hot and cold water laid on. There is a specially constructed fire-place for preparing small articles of ward cooking, keeping diets and drinks hot, preparing fomentations, poultices, &c. There is also a closet heated by hot water pipes for warming and airing bed-linen and patients' linen.

In working the hospital, patients will be received in the following manner: Close to the barracks at Woolwich there is an existing building which, with trifling alterations, will afford every accommodation for the medical officers of brigades to receive and examine their own sick. All men reported sick will present themselves there. The same building contains space for a few beds, intended for the reception of patients taken suddenly ill through the night. When the reception is over, the sick admitted will be sent up to the Herbert Hospital by ambulance, or those who are able will walk. On arriving there they will enter the waiting room, and be received into hospital in the usual way, after a record of their cases has been entered. From the examination room the patient will proceed, under cover, to the general bath-room and dressing-room, where, after bathing, he will receive a suit of hospital clothing, his own clothes and property being carried down by the small special staircase to the pack store. He will then be taken to his ward.

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Service.

All the cooking, except in an emergent case of rare occurrence, will be done in the kitchen, in conformity with the ward diet-rolls, sent to the cook by the captain of orderlies. The diets will be cut up on a hot plate close to the serving windows, which open upon a lobby connected with the basement or service-corridor of the hospital. At these windows the diets made up according to wards will be delivered to the orderlies, who will convey them to the lift appropriated for each pavilion. The trays will be placed on the lift, and a signal made to the orderlies of the wards above. The water pressure will then be turned on until the lift arrives at the doors on the floors above, when the diets will be removed from the lifts by the ward orderlies and carried direct into the wards. After dinner the dishes will be sent down by the same means. But instead of being returned to the kitchen they will be carried to a separate window, where they will be received and taken into the kitchen scullery to be cleaned for further use.

So short a time will elapse between the issue of the diets in the kitchen and their reception in the wards that there will be no danger of their becoming cold.

Medicines will be conveyed to the sick in a similar manner. The pharmacy, drug store, and dispensary, as already stated, are situated in a small pavilion connected with the basement-corridor. The medicine trays, containing the made-up prescriptions, will be given out at the dispensary window, which opens on to the corridor, and carried by orderlies to the lifts, to be sent up to the respective wards, where they will be received by the orderly in attendance.

All the fuel required for the wards will also be sent up, in specially constructed boxes, by the lifts. The coal store is under part of one of the courts, and is connected with the basement corridor, but has a separate ventilation.

Daily Hospital
Service.

The clean linen required for the day's use will be received by the orderlies over a counter in the linen store, and carried under cover into the ground floor corridor, whence it will be distributed to the wards on the different floors by the pavilion staircases.

The foul linen will be sent down to the basement separately from each pavilion by means of the shoot, and will be received into small well-lighted and ventilated closets, whence it will be collected and carried to the western end of the basement corridor, and discharged through a door into a cart, which will convey it straight to the laundry on the opposite side of the Dover Road. After being washed the linen will be returned, as already mentioned, to the clean linen store.

The ward ashes will be sent down from each pavilion in the lift, and dust from the sweeping of the wards will be sent down the dust shoots at each pavilion, and received in the basement corridor into an iron hopper, whence it will be emptied by pulling down the door of the hopper into a box on wheels, and taken to the western end of the basement corridor to be discharged into the dust cart.

The speaking tubes, signal bells, and bells generally, which have been provided at each pavilion between the several ward floors and the basement, and which have already been described, will enable bell signals to be made, and verbal communications to be carried on for all required purposes between the staff to be allotted for duty in each ward and the staff to be allotted for duty in the basement.

CONCLUSION.

Conclusion.

It will be seen from the foregoing description that the principles upon which the Herbert Hospital has been constructed were those laid down by the Royal Commission on the Sanitary State of the Army in 1857, further developed by the Barrack and Hospital Improvement Committee; and embodied in the Medical Regulations of the Army of 1858. In designing the plans for the hospital and the contingent arrangements according to those principles, I was assisted by Mr. R. O. Mennie, Surveyor of Works to the War Department. The plans were examined in detail by Lord Herbert, and submitted by him to Miss Nightingale, whose practical experience was of great assistance in the design. They were further submitted to and received the concurrence of the Director General of the Army Medical Department and of the Barrack and Hospital Improvement Committee. Captain Newsome, R.E., superintended the works as executive officer under the Commanding Royal Engineer, who was at first Colonel Ford, R.E., and latterly Colonel Hawkins, R.E., and he was assisted by Mr. Ware, Mr. Parry, and Mr. Tait, clerks of works. Messrs. Myers and Son were the contractors and executed the work in a satisfactory manner. Mr. Homersham, C.E., was employed to design and superintend the construction of the reservoirs for softening water placed on Shooter's Hill.

The advantages which the principles of hospital construction embodied in the Herbert Hospital afford may be briefly summed up as follows:—

1. Limitation of the number of sick under one roof.
2. Complete separation from each other of the wards containing sick.
3. Abundance of fresh air and ventilation in every part of the building allotted to sick.
4. Complete separation of the ward offices from the wards.
5. The use of non-absorbent surfaces in the wards and ward offices.
6. Abundance of light, as well as light-coloured surfaces, especially in the ward offices by which cleanliness is promoted
7. Facility of administration.

These principles have also been adopted in the small regimental hospitals of Hounslow, York, Fleetwood, and Hilsea, designed under the instructions of the Barrack and Hospital Improvement Committee.

The Barrack and Hospital Improvement Committee in thus developing the principles of hospital construction do not claim to have adopted, except in details, much that is positively new; but they do claim to have embodied, and to have worked into each other, with such improvements as experience and consideration dictated, the best points in the best existing civil and military hospitals both at home and abroad. The small regimental hospitals constructed on these principles have fully answered their purpose. In the Herbert Hospital we have for the first time a building for nearly 650 sick, consisting of separate pavilions, each no larger than a regimental hospital; and there is every reason to expect that in it the nation has a building possessing all the advantages of administration which can be afforded by the consolidated establishment of a large general hospital, combined with all the sanitary advantages of a small regimental hospital. Conclusion.

I have the honour to be, my Lord,

War Office,
19 June 1865.

Your obedient Servant,
DOUGLAS GALTON.

APPENDIX No. 1.

LIST OF DRAWINGS, &c.

1. Block plan, showing ground.
2. Isometrical view, showing general arrangement of buildings.
3. Plan of basement, showing drainage.
4. Plan of ground floor.
5. Plan of first floor.
6. Plan of second floor.
7. Section of terrace with elevation of ends of pavilions, and section of corridor, shewing levels of boiler-house, kitchen, &c.
8. Elevation of front building, with ends of pavilions, showing levels.
9. Plans of double pavilion, showing wards.
10. Plan of lavatories, &c. at end of wards.
11. Section of lavatory, plan and section of vapour bath, plan of hot-water coils, drawing of scraper, plan of hollow external walls.
12. Section of valve watercloset plan, elevation and section of washing basins, plans and elevation of foul linen, and dust shafts. Plan and section of sink for emptying portable bath.
13. Plan and sections of slop-sink; drawing of bath. Plans and elevations of urinals.
14. Elevation and section of dust shoot; plan, &c. of ward, gas pendants. Plan and elevation of ward scullery sink, drawing of arrangement for wheeling patients out on to corridor.
15. Plan, section and elevation of ward, ventilating fire-places, and of internal soot-doors from ward flues.
16. Plan and sections of flues from ward ventilating fire-places; drawing of oak skirting of ward floors.
17. Plans and sections of ventilating shafts.
18. Section of ward staircases.
19. Details of ward staircases.
20. Plans and sections of hydraulic lifts.
21. Plan and section of boilers and engines, &c. for hydraulic lifts.
22. Plans, &c., showing arrangement of ventilating grate for offices, officers' quarters, &c.

Water Supply, Buildings, &c.

23. Block plan, showing drains, pipes, &c.
24. Ground plan of buildings.
25. First floor plan (below gallery).
26. First floor plan (above gallery).
27. } Sections through reservoirs.
28. }
29. } Elevations of building.
30. }

Washing Establishment.

31. } Elevations, plan and section of washing establishment.
32. }

APPENDIX No. 2.

DESCRIPTION of the NEW PATTERN VENTILATING STOVE, with Explanation of the Mode of fixing.
(See Drawing No. 22.)

The Stove is of the best cast iron, manufactured by Messrs. Kennard of 67, Upper Thames Street, London, in three pieces, properly connected by screws. The first piece forms the moulded projecting frame; the second, the body of the grate; and the third, the nozzle or connexion with the smoke-flue, the bottom flange of which is bolted to the back of grate as shown in Section, fig. 2.

The Stoves are of three sizes.

The *largest* has an opening for fire of 1 foot 9 inches wide, and is for rooms containing from 8'400 to 12'000 cubic feet, and weighs about 3 cwt. 1 qr. 10 lbs.

The second, or medium size, has an opening for fire 1 foot 5 inches wide (as shown on the drawing), and is for rooms containing from 3'600 to 8'400 cubic feet; it weighs about 2 cwt. 3 qrs. 5 lbs.

The third, or smallest size, has an opening for fire 1 foot 3 inches wide, and is for rooms containing 3'600 cubic feet and under; it weighs about 2 cwt. 2 qrs.

Figures 1, 2, and 4 show an elevation, section, and plan of the second or medium size stove, the extreme dimensions of which are 40 inches wide by 42 inches high; the breadth of the fire being 17 inches on the front line.

The fire-place has a lining of fire-lumps in five pieces; two sides, one back, and two bottom pieces, moulded to the form shown on the drawing.

The bottom is partly solid, being made of two fire-lumps, placed on each side and supporting an intermediate cast iron fire grating; by this means, whilst the draught is checked and the consumption of fuel reduced, a sufficient supply of air for combustion at the bottom of the fire is obtained. A clear space half an inch deep is formed between the back lump and iron back to receive a supply of air through the ashpit under the grate, which passes through a slit in the fire-lump immediately above the fire. The air thus brought into contact with the heated coal is received at a high temperature in consequence of passing through the heated fire-lump, and is forced into contact with the gases from the coal by means of the piece of fire-lump which projects over the fire at the back of the grate, and thus a more perfect combustion of the smoke is effected than with an ordinary grate.

The flame, heated gases from combustion, and smoke are compelled, by the form of the back of the grate and the iron

part of the smoke flue, to impinge upon a large heating surface, so as to extract as much heat as possible out of them before they pass into the chimney, and the heat thus extracted is employed to warm air taken directly from the outer air. This air is warmed by the iron back of the stove and smoke-flue, upon both of which broad flanges are cast, so as to obtain a large surface of metal to give off the heat.

This giving-off surface is sufficient to prevent the fire in the grate from ever rendering the back so hot as to burn the air it is employed to heat. The fresh air after it has been warmed is passed into the room near the ceiling by the flue shown in the drawing. The object of admitting the fresh warmed air at the chimney breast, and near the level of the ceiling, is because at that point it flows most easily into the currents which exist in the room; as it is found by experiment that in a room with an open fire, and with the doors and windows closed, the current of air is drawn along the floor to the fire, where a portion passes up the chimney, but the remainder is carried up the chimney breast towards the ceiling, near which it passes till it approaches the end of the room furthest from the fire, when it again descends to follow the same course.

The recess in which the ordinary stove is fixed forms the chamber in which the air is warmed.

In order to afford facilities for the occasional cleansing of this chamber, and those parts of the air channels connected with it, the front of the stove is secured by screws, so that it can be easily removed, thus rendering the air chamber accessible.

The drawing Fig. 5 shows the method to be adopted in fixing the Stoves in *old* openings, *i.e.*, in fire-places which now have the ordinary old pattern 4 feet ranges; the parts strongly hatched being brickwork, built in cement, and toothed in the old jambs. The air chamber is to be left as large as possible, thoroughly cleansed from all old soot, and rendered with cement and lime-white. Should the fire-place be deeper than 1 foot 6 inches, which is the depth required for the curved iron smoke flue, then a lining of brickwork is to be built up at the back to reduce it to that dimension.

The chimney-bars, if too high, must be lowered to suit the height of the stove, or to a height above the hearth of 3 feet 3 inches; they must also be straightened to receive the covering of the air chambers.

These coverings should be of 3-inch York or other flagging, cut out as shown by the drawing fig. 6, to receive the curved iron smoke-flue, and also to form the bottom of the warm air-flue in the chimney breast.

In new buildings the air chambers may be rectangular, as shown by the plan of drawing fig. 4; they must be 4 inches narrower than the extreme dimensions of the stove, so as to give a margin of 2 inches in width all round for a bedding of hair mortar.

From this air chamber the air is conducted into the room by a shaft shown by dotted lines, in elevation fig. 3, and in section in figs. 9 and 10.

The air and smoke-flues in the chimney breasts must be formed as shown by the dotted lines in drawing fig. 3; the smoke-flue is to be left the ordinary size, about 14 inches \times 9 inches. In fixing the iron smoke-flue to the body of the stove, the flange must be bedded in red lead, to make it smoke-tight. The air-flue is to have an area equal to one square inch for every 100 cubic feet of contents of the room. This air-flue must be carefully rendered inside, and made quite air-tight, by having the brickwork between it and the smoke-flue chased into the wall at the back, and bonded into the work forming the front of the chimney breast.

The opening left for the air-flue in the covering stone is to be only two thirds of the area of the flue itself, for the purpose of checking sudden gusts of wind.

The air-flue is to be terminated by the louvre described in the Circular Memorandum, dated 20th May 1862. *I. G. F.*
General No. 2 20
2685, which should be fixed about 6 inches from the ceiling.

In cases where the stoves are fixed in rooms which have open roofs, the louvres should be placed about 11 feet from the floor line.

In rooms on the second floor of a building it frequently happens that all the smoke-flues are gathered towards the centre of the chimneys, so that there is not sufficient room for the formation of the air-flue, as described in the drawing fig. 3; in such cases, if there should be a depth from the chimney breast to the back of the smoke-flues of $22\frac{1}{2}$ inches, the air-flue may be brought altogether in front, as shown by the drawing fig. 7; but should there be not more than 18 inches, an addition of half a brick may be made to the chimney breast.

The mode of admitting the external air into the chamber in rear of grate will depend on the locality of the fire-place.

If the chimney be built in an external wall, the air may be admitted through the wall at the back, though not in a direct manner, but as shown by drawing fig. 11. The total area of this inlet must be the same as the air-flue, viz., one square inch for every 100 cubic feet of contents of the room, and the external dimensions of the grating covering it the same.

If on the floors they should be made of 1 inch deal, if under the ceilings of $\frac{3}{4}$ inch deal, or if under the ground floor, where there is no basement, of glazed terra cotta pipes. Where pipes are used they should be laid with chairs or saddles, so that access to them may be readily gained; and where deal is used they must be invariably wrought inside, and ploughed and rebated at the angles.

In all cases some part or parts of these ducts must be made easily removable, by being fixed with screws, for the purpose of being periodically cleaned.

In determining the positions of the inlet ducts for fresh air, it will be desirable that they should open on the south or west sides of the buildings, if possible, away from gully gratings or nuisances, and be raised at least 2 feet from the ground.

DOUGLAS GALTON,

MAY 1862.

Assist. Inspector-General of Fortifications.

APPENDIX No. 3.

SPECIFICATION for the Erection of the HERBERT HOSPITAL on KIDBROOK COMMON, near WOOLWICH.

This Specification provides for the erection of a Military Hospital on the site recently acquired by the War Department near Shooters Hill, in accordance with the drawings numbered 1 to 230 inclusive, which are open for inspection at the War Office. The General Plan No. 1 is an accurate survey of the ground, with its various boundaries, roads, &c., as at present; the contour lines are in blue, and have reference to the various levels which are indicated by red figures. The whole of the levels have reference to a bench mark 249 feet above the Ordnance datum, and a plane extending from this mark and shown on all elevations and sections by a red line, is the working datum to which all levels and figures refer which may appear on the various drawings.

Plan No. 2 is intended to show the general arrangement of the proposed building when finished, with the various walks, roadways, terraces, garden beds, boundary walls, &c., &c., adjacent or belonging to it.

Plan No. 3 shows the general system of drainage, divided into three sub-systems, one of which is also composed of two subdivisions, these are indicated on the plan by different colours, thus;—the surface joining into the foul water and soil drainage is coloured red; the rain water from the roofs is coloured blue; and the foundations and land drainage yellow: the first mentioned is conducted into the newly-constructed main sewer falling into the Thames; the second is brought into a large covered tank; while the third is turned in an opposite direction, and after leaving the Hospital site, finds its way by open ditches, &c., to Lee.

Plan No. 4 shows the gas mains and general distribution of same at basement level, while the upper floors are marked respectively 4a and 4b.

Plan No. 5 shows the supply and distribution at level of basement of the water for use of the Hospital, the upper floors being marked respectively 5a and 5b. In these plans the cold service is coloured blue, the hot service red, and the coils and heating system yellow.

The remainder of the drawings show the general structure and arrangement of the building in plan, section, and elevation, and are to be accurately followed and adhered to. In all doubtful cases, the large scale sections to be preferred to the smaller ones, and figured dimensions to those shown only by scale, but

in all cases the decision to rest with the Superintending Officer, or the Commanding Royal Engineer.

The hot and cold water services, fire-main and heating services, together with the machinery, engines, lifts, and pressure pipes for working the same, and also the gas service, will be subsidiary contracts. But the Building Contractor is to render every assistance required in carrying out the same, and is to execute all brickwork in shape of wells, tanks, engine beds, &c., which may be required of him, and to work as far as possible in unison with the other Contractors for the due advancement of all.

Subsidiary contracts will likewise be made for a wire fence as shown on General Plan; for planting borders near boundary walls, for a clock to be fixed where shown, and for these or any others entered into hereafter, the Contractor is to provide any labour or assistance required for the due execution of the same.

For these subsidiary contracts, as well as for Water Reservoirs to be erected on Shooters Hill for the supply of the Hospital, distinct specifications and sets of drawings have been prepared, and are headed in accordance with the respective services.

EXCAVATOR.

ART. 1. Perform all ground work necessary for the clearing of the site in and about every part of the enclosure, and remove to spoil, as may be directed, all brushwood, furze, stumps of trees, and other substances likely to interfere with the progress of the work.

Execute all digging to the several required lengths, breadths, and depths for all foundations, sewers, drains, drain-pipes, cess-pits, slopes, terraces, trenches, areas, tanks, wells, vacancies under floors, making up and filling in of hollows, &c., and the removal of groundwork generally, and levelling and ramming where the several buildings, yards, courts, &c., require for the completion of the whole; and also for all other works which require the ground to be excavated, levelled, removed, made up or filled in, &c., to the lengths, breadths, and depths shown or figured on the drawings herewith given, or hereafter to be given.

Clearing ground, digging, and filling in and levelling, &c.

Removing earth and rubbish.

Art. 2. All earth or rubbish arising from the several levellings and excavations on and about every part of the site is to be removed and placed in such situations on the ground as are required to be raised or levelled, or to fill in the hollows or variations of levels about the buildings, or to form the various terraces, slopes, levels of roads, footways, courts, yards, &c., as may be indicated on the several drawings, and wherever the Superintending Officer may direct.

Roadways, paths, footways, courts, &c.

Art. 3. The whole of the inner court, entrance roadway, new footways, terrace, garden paths, and all other parts shown in yellow colour on Drawing No. 1, are to be formed in the manner shown, with all necessary currents, and to the several lengths and widths indicated or figured on the Plans, to be covered with a 6-inch coating of burnt clay, as described in Article 8, properly rammed down and consolidated with 4 inches of gravel thereon, well rolled, and to be left in every respect complete and perfect. The terrace and garden walks to have a fine coating of gravel, 1 inch thick, laid over the coarse gravel, well rolled, any superfluous earth that may accumulate is to be cleared and carted away, or to be laid on such portions of the inclosure as may be directed, and at the completion of the works the premises are to be left perfectly clean and clear.

Gardens.

Art. 4. The whole surface of the gardens between the pavilions and in other parts, indicated on Plan No. 1 by a brown tint, is to be properly formed, raised, or sunk, and levelled as may be directed, and is to be covered with good vegetable soil to a depth of not less than 2 feet. The Contractor is also to provide at his own expense and sow sufficient quantities of ryegrass and white clover seed for those parts shown on the same Plan by a green tint, such seed to be in all cases sown in not less than 1 foot 6 inches of vegetable soil, or form beds with turf borders, as may hereafter be directed.

Time of formation.

Art. 5. The formation of the several roadways, footways, terraces, garden paths, and gardens, to be executed at such times as may be directed by the Superintending Officer.

Backing of fence wall.

Art. 6. The backing of fence wall round the north-east portion of the inclosure to be of chalk rubble, hand-packed to the extent and in the manner shown on Drawing No. 84, to be covered with 8 inches of burnt clay to within 4 inches of the surface, which is to be of screened gravel as before described, the path to be laid and current to curb as indicated. The backing, where not of chalk, to be of burnt clay as shown.

Drains.

Art. 7. The excavations for the several drains and drain-pipes to be made to the depths figured on Drawing No. 2, which figures relate to the bottom of the pipes in all cases; the bottoms to be levelled to a regular and uniform fall in each instance, and to be rammed solid wherever necessary.

Burning clay for roads, &c.

Art. 8. The Contractor is to burn on the spot, at such times as shall be directed, sufficient clay earth for covering the terrace garden paths and footways with a layer 6 inches in depth. Fuel is to be provided for this purpose, and the material to be spread and rolled when required.

BRICKLAYER.

Brickwork.

Art. 9. All the brickwork to be executed in the best possible manner with the best hard-burnt stocks, of perfect soundness; no soft, place, or inferior bricks will be allowed to be used.

Facings.

Art. 10. The external walls of the Hospital buildings and front building to be faced with white Suffolk brick of approved quality, specimen deposited at the War Office, Pall Mall, properly bedded and bonded into the brickwork of walls; to be laid in Flemish bond, but no false headers will be allowed to be used.

The boundary and terrace walls to be faced with picked stocks, of uniform colour and shape, laid as described for Suffolk white bricks.

Bonders.

Art. 11. The hollow walls to wards to have the external facing connected with main wall by means of Jenning's patent bonding bricks, as shown on Drawing No. 96.

Colours indicating brick and stone.

Art. 12. All walls tinted red on sections, and yellow on the elevations, are to be built of brickwork; the stonework for plinths, quoins, columns, pilasters, architraves, archivolt, strings, blockings, balusters, parapets, and such like, being indicated by a brown tint in the sections and details referring thereto, and a description of which, with the different materials employed, will be found under the head of Mason's Work.

Bricks to be watered.

Art. 13. The bricks in course of being used, as well as the brickwork in course of erection, shall, in the event of dry weather, be well watered at the Contractor's expense, when and

as often as the Clerk of the Works or Superintending Officer may deem necessary for the stability of the work.

Art. 14. The whole of the external facing is to be carried up in Flemish bond, and the internal walls generally in English bond. False headers are never to be used, and no joint is to exceed one third of an inch in thickness; to be worked fair inside and flat pointed wherever it is to be whitewashed, and otherwise rough-drawn as a key for the plastering; every alternate course of the work to be thoroughly grouted with liquid mortar.

The brickwork is to be carried up regularly, and no part left more than 3 feet above any other parts, and to be truly levelled every 7 feet in height.

Art. 15. The whole of the brickwork of the side walls of all wards to be built up from the level of the top course of footings to within four courses below the under side of eaves, with a cavity 3 inches wide, and nine inches from external face of wall, in the manner shown on the several sections and details; the brickwork to be bonded in such manner as to ensure perfect stability throughout.

Art. 16. The lime to be used is to be the best Dorking or Halling, or other equally approved stone lime; it is to be used as fresh as possible, kept closely covered before used, and made into mortar with such clean, sharp water, river or pit sand, as the Superintending Officer may approve, free from saline particles, and all earthy and vegetable matter, thoroughly screened in the proportion of one-third lime and two-thirds of sand, or in such other proportions as may from time to time be ordered, thoroughly compounded and mixed in pug-mills, and made up in quantities only sufficient for immediate consumption; the water to be used for this purpose must be pure, fresh, and free from all loam, clay, saline particles, or vegetable matter.

Art. 17. The Contractor is to provide at his own expense such measures as the Superintending Officer may direct for ascertaining the proportions of the materials used, and to keep the same on the ground for the use of the Clerk of the Works.

Art. 18. The grout to be in the same proportions as, and of the same materials as, the mortar, mixed up as wanted in large tubs, and only used by pouring into the works from buckets with ladles, taking care that none is to appear on the exterior face of the walls.

Art. 19. The roman or other cements are to be of approved quality, to be used fresh, with perfectly clean-washed sharp sand, in equal quantities, except for linings of tanks, which are to be in two parts of cement to one of sand. Thirty-six bushels of cement to be calculated for every rod of brickwork, and no cement is on any account to be used after it is set or begun to set; in either case the Contractor is to remove the same from the works.

Art. 20. The concrete is to be composed of perfectly clean gravel or ballast, free from loam, clay, vegetable, or other foreign substance or matters, with the proper proportion of sand and small stones, and unslaked ground, fresh well-burnt stone lime from Dorking, or other of equal and approved quality, in the proportion of six parts of gravel to one of sand, and one of lime measured dry, well compounded, as described for the mortar, brought to a proper consistency, mixed just before and as it is required for the works, thrown into the trenches while hot, and shot and distributed in even surfaces from a height of not less than 6 feet from the level of the concrete; to be well saturated with water in layers, not exceeding 12 inches in each layer, and to be completed and brought to a level surface before another layer is commenced. Concrete is to be laid under all walls to the several depths, widths, and thicknesses, shown on the drawings, the ground in all cases to be brought to a level surface for the reception of the same; concrete shall also be laid under all paving or flagging or asphalt, wherever shown on the drawings, in the filling in of spandrels of all brick arches, and in all floors wherever Fox and Barrett's patent is specified to be used, and which are shown in detail on Drawings of Fire Proof Floors; the concrete of these floors, however, shall be made with burnt ballast in lieu of shingle.

Art. 21. In consequence of the variations of the surface and the inequality of the soil, the depths, widths, and thicknesses of concrete, shown on the several drawings, may prove inadequate to ensure a perfect foundation. The Contractor is, therefore, to provide from time to time, as the trenches are dug, such extra quantity as the Superintending Officer or Clerk of Works may direct, which extra quantity will be measured and paid for as an extra, in accordance with the price in the Schedule of Prices accompanying this Specification; and should any deduction in

the quantity of concrete, shown on the several drawings, be considered necessary by the Superintending Officer or Clerk of Works, such quantity will be measured and deducted from the amount of the Contract, in accordance with the Schedule of Prices above mentioned.

Art. 21 A. On the outer side of all trenches prepared to receive concrete, a brick drain of construction shown in drawings shall be formed, and proper connections made with same by means of 6-inch pipes, communicating with 9-inch main, carrying off water from foundations.

Art. 22. Provide and build in, where directed, for ventilation under floors and other purposes, wherever required, Jennings' patent terra-cotta air-bricks, equal to samples to be seen at the War Office, Pall Mall, and form flues for the same through the walls.

Art. 23. Provide and build in, wherever shown on the several drawings, moulded and splayed bricks of the same quality as the facing bricks for strings, plinths, bedmoulds, and impost mouldings.

Art. 24. The pipes to be used for the several purposes of soil, surface, and rain-water drainage are to be glazed stoneware of the tubular dimensions indicated on drawing No. 2, those of 6 inches and upwards to be chair and saddle pipes, as per sketch, the remainder to be socket pipes, jointed in roman cement and sand of equal proportions, and to include all proper bends, elbows, single and double junctions, and syphon traps, to be laid on an even bed with such falls as may be indicated on the Drainage Plans and Sections, or as may be directed by the Superintending Officer; the ground to be carefully rammed at every foot rise, and the surface earth to be put aside and used for finishing the ground level.

The main drain from A to B, shown on Plan No. 2, and from C to D, to be 12 inches in diameter, and from B to C and D to E 9 inches, the junctions at each point, and at the connection with the main sewer already constructed from the point A, to be carefully effected, and to be submitted for the approval of the Superintending Officer or Clerk of Works before they are closed in. The soil pipes to be 6 inches in all cases; the pipes from urinals, sinks, ablution rooms, baths, &c., to be all 4 inches, except when figured otherwise on the plan of the drainage. The rain-water pipes to be in no cases less than 4 inches, 6-inch pipes being laid for the mains, as shown on the same plan. All soil, urine, sink, and waste pipes to be trapped as per sketch, the trap to be made of glazed stoneware, in one piece, and to have a moveable stoneware cover. The junctions with the main drains to be carefully effected and tested before the ground is filled in. The pipe drains for the removal of the surface water to be 4 inches, and to be laid as shown on the Drainage Plan by yellow lines.

Art. 25. Gully traps of glazed stoneware, of the shape and dimensions shown on Drawing No. 96, to be provided and laid wherever indicated on the plans, the earth to be well rammed on all sides, and the junctions to be carefully executed. To have square stoneware moveable covers perforated as shown, and dropped into the socket edge of trap.

Art. 26. The cess-pits to be constructed where shown of 9-inch brickwork on 6 inches of concrete, of the dimensions figured on Drawing No. 96, and to be rendered inside with Roman cement; the dip stone to be 2-inch York, let into walls 2 inches at each side, and dipping into the water 4 inches, the curb to be of Purbeck stone 12" x 6" half-plain on beds, tooled on face and edges, plugged and jointed with cement, and rebated for iron gratings.

Art. 27. The drains shown on Drawing No. 84, at back of boundary and terrace walls, are to be 9-inch glazed earthenware pipe, laid with a loose joint and to a fall as indicated. Dry brushwood to be laid over the entire length of the pipe, and the ground made up as described under excavators' work.

Art. 28. The brick and stone work to be well bonded together, great care being taken to preserve the solidity and substantiality of the work.

Art. 29. Leave apertures in the walls for all doors, windows, archways, chimney openings, and apertures for ventilators, wherever shown, described, or directed, with all other apertures required, and to leave chases wherever required for the fresh air, foul air, rain, soil, water, gas, and steam pipes and tubes. Cut and perform in a workmanlike manner, all mortices, rail holes, and rebates, also chase and groove and point with cement,

where necessary, for asphalte fillets, lead dressings, &c., and after other artificers.

Art. 30. The Contractor is to cover with tar and sand the hoop-iron supplied by the smith (No. 18 Gauge), and to fix the same in the building where directed. Two double tiers to be laid in each story (except where the fire-proof floors occur, for which provision has been made under the head of fire-proof flooring, and in the uppermost stories throughout), one double tier is to be laid immediately below the window-sills, and the other just below the ceiling line.

Walls 1 brick in thickness are to have 1 piece of hoop-iron in each tier, 1½ brick walls to have 2 pieces in each tier, 2 and 2½ brick walls to have 3 pieces in each tier, and walls of 3 or more bricks in thickness to have 4 pieces of hoop-iron in each tier. Each double tier of bond is to be laid in 3 courses of brickwork in cement, through the entire thickness in internal walls, and within one-half a brick of the face in external walls.

Art. 31. The shoots to beer and coal cellars are to be built in brickwork in mortar, as shown, and finished level on top to receive stone curbs.

Art. 32. Provide and lay in Portland cement, with a close cement joint, those portions of corridor, &c., indicated by a brown tint on ground plan, six-inch black, red, buff, and chocolate coloured tiles, ½-inch thick, in accordance with drawing, properly bedded on concrete in cement. The space within the communion rail to be paved with similar tiles, laid as above described. A portion of the above tile paving to be laid for approval previously to commencing the whole. See Drawing No. 105.

Art. 33. The arch over drying closet in wash-house to be formed of three courses of plain tiles in cement, laid to break joint, well bedded and cambered, as shown on drawing, and form all necessary openings in same for pipes, &c.

Art. 34. Set over all external door, window, and other openings, square, segmental, or semicircular, as shown, gauged arches formed of moulded bricks, 15 inches on the face, except where otherwise shown as 9 inches or 12 inches in detail drawings, the joints worked the full thickness of the arch and soffit, and well bonded together. The joints are to be afterwards raked out and the pointing to be finished like the brickwork in connection with it. These bricks are to be similar and equal in quality to samples which may be seen at the War Office, Pall Mall.

Art. 35. Turn brick arches over all door, window, and other openings, where required and ordered, rising 1 inch in each foot of opening, in half Roman cement and sharp river or pit sand and fresh water, within the exact thickness of the stone dressing from the external face of the wall, with proper cut skew-backs. The whole of the internal openings to be the whole thickness of the respective walls, turned with 3 half brick rings, except where otherwise shown on the several sections. All splayed arches over ward windows where supporting iron joists for fire-proof floors, to be strengthened with two iron lintels, set in the manner and of the dimensions shown on drawing.

Art. 36. Inverts to be turned under all openings, wherever shown on the plans or sections, in 3 half brick rings and of the full thickness of the respective walls, with proper cut skew-backs, and to have a rise of not less than 1½ inches to every foot of opening.

Art. 37. Turn discharging and relieving arches over all openings, and wherever directed or required for the security of the work, the segments to be neatly filled up and cut to backs, the skewbacks to be accurately formed and the backs rendered smooth.

Art. 38. Turn groin arches in cement over the coal cellar and under the entrance gateway, in half brick rings, and of the thickness shown on the drawings, with the groin points or arrises accurately cut, and the spandrels filled in flushed with concrete. The whole of the vaulting to be thoroughly grouted, in a solid manner with liquid mortar. The outer walls supporting groined arches of coal cellar to be tied together with 1½ inch wrought iron tie rods, properly supported to internal piers, and provided with screwed ends and nuts, for the purpose of securing the cast-iron shields of the form and dimensions indicated on drawing.

Art. 39. The arch over the passage of communication between the centre building and the hospital buildings is to be

Hoop-iron bond.

Beer shoots, &c.

Tiles.

Tile arch.

Gauged arches.

Rough and axed arches over door, window, and other openings.

Inverted arches.

Relieving arches.

Groined arches.

Arch over underground passage.

Air bricks.

Moulded and splayed bricks.

Pipe drains.

Gully traps.

Cess-pits.

Drain at back of boundary wall.

Brickwork bonded to stone dressings.

Apertures, chases, &c.

formed in three half brick rings in cement, and the spandrils filled in flush with concrete. The area windows are to be groined into the arch as shown.

Arches under end staircase.

Art. 40. The arches under staircase of No. 7 Pavilion to be formed in hollow brickwork, in two rings, the arches to spring from east-iron girders, with proper cut skewbacks, and to rise $1\frac{1}{2}$ inches in every foot.

Chimney arches.

Art. 41. Cut all splays and turn chimney arches in two half brick rings over all chimney openings, on wrought-iron chimney bars, $3'' \times \frac{1}{2}''$

Fenders and trimmers.

Art. 42. Put to each of the fireplaces on the ground story fenders of $4\frac{1}{2}$ inches brickwork, when the same can be properly applied to support the slabs, and of such heights as the profile or nature of the ground may require, and put to all the fireplaces in the upper stories brick trimmers 18 inches longer than the clear width of the respective openings and 18 inches wide.

Temporary openings.

Art. 43. Leave temporary openings in such walls and situations as may be directed for getting in boilers, warming apparatus, or any other purposes, and make good the same when required.

Point after work.

Art. 44. Any brickwork that may be affected by the frost to be pointed in the spring succeeding the certificate of the completion of the buildings.

Point.

Art. 45. All brickwork to be well bedded in mortar or cement, and the facings to be carried up in the rough, and pointed when directed in the most careful manner with a neat flat joint, and jointed.

Clean off.

Art. 46. Clean off all soffits of cement and mortar arches which are intended to be coloured or limewhitened immediately the centering is struck, and while the mortar is soft.

Bed in mortar or cement.

Art. 47. Bed in mortar or cement all plates, doorcases, door and window frames, wood-bricks, bond timber, lintels, templates, girders, and all timbers, stone, or iron, or whatever else may so require. Set, bed, and back out all the stonework in door and window openings, the dressings to windows, archivolts, key-stones, architraves, entablatures, cornices, quoins, chimney-caps, strings, blockings, columns, pilasters, &c.

Setting hearths.

Art. 48. Bed all hearths solid in mortar at front of all chimney openings, and back hearths to all the fireplaces throughout the building. All hearths to be level with the floor on the top side.

Cut and rub.

Art. 49. Cut and rub all requisite splays, skewbacks, ranges, and chamfers; form all groin work; securely pin in, when necessary, with stone, tiles, slate or iron wedges, ties or cramps; set the same in cement, and cut out all the chasings and toothings for inletting of pipes, ventilators, air-gratings, louvres, &c., and perform all labour of every kind necessary to carry out the intention of the work in every respect, and corbel out for all projections in brickwork or stonework, for chimney breasts, chimney shafts, support of stairs, steps, or landings, bearings for flues, arches, or for any other purpose whatever required.

Bond courses.

Art. 50. Bond courses, in cement, to be built when directed by the Superintending Officer, as the work proceeds, and hoop-iron to be built in the same, of such substance and in such manner as may be directed, for which purpose include 20 rods extra of brickwork in cement and 5 tons of hoop iron bond, to be paid for if used. The piers at angles of ward staircases are to be built up in cement from the foundations.

Rusticated brickwork.

Art. 51. The rusticated brickwork to porches, piers, and retaining walls where shown, is to be executed as before described, with neat and sharp arrises, and constructed with a battered face wherever shown on the drawings.

Fixing mantel-pieces.

Art. 52. To fix all iron and other mantel pieces to chimney openings, the iron cramps for the same to be securely built in the brickwork, and when built in afterwards to be in cement.

Watchman.

Art. 53. The Contractor will be required to station a watchman on the premises at his own cost, till the completion of the work.

Reparation.

Art. 54. Repair, amend, and rectify all settlements, cracks and defects which may at any time occur, by reason of accident or other cause (such as can reasonably occur to a Contractor) during the progress of the works, and during twelve calendar months after the certified completion of the same.

Art. 55. The Contractor is to omit no materials or workmanship whatever which is either necessarily connected with or implied in the proper completion of the works, as shown in the drawings or described in the specification.

Materials and workmanship.

Art. 56. Provide and build in cement near the ceiling, between each window, in the day-room, in all the main wards, and over each window in the small wards, also to each ward-lavatory and water closet, a Sherringham's ventilator, bronzed. Those in the wards to be 9 inches by 3 inches, and those in ward waterclosets and lavatories to be $13\frac{1}{2}$ inches by 6 inches.

Sherringham's ventilators.

Art. 57. Set all the stoves, ranges, coppers, &c., with stock bricks laid in mortar, and all necessary Welsh lumps, fire bricks and fire clay, and construct all requisite air flues in connection with the ventilating stoves of such dimensions as may be directed.

Setting stoves, ranges, boilers, &c.

Art. 58. The joints of all the work and such of the rooms, stores, cellars, or underground story, not intended or described to have the walls rendered, are to have a neat flat-joint, and to be twice coloured or lime-whited as may be directed. All inequalities of surface in unplastered walls to be rubbed smooth.

Neat flat joint and colour or lime white.

Art. 59. All the smoke flues, except boiler and ward flues, to have 9-inch tubular unglazed earthenware socket-pipes, and proper bend pieces, elbows, &c., and jointed in cement.

Smoke flues.

Art. 60. The vertical smoke flues from the ward stores to be constructed as shown on Drawing No. 80 with 9-inch square flues in the thickness of the walls, to be made in the manner shown on detail Drawing.

Ward flues.

These pipes are to be made in 12-inch lengths, grooved and jointed with hoop-iron in cement, with all necessary elbows, bends, &c.

All smoke flues to be set and jointed in cement, and built in solid with brickwork in mortar.

Art. 61. The flue or shaft from the boiler-house to be constructed underground, as shown, with $1\frac{1}{2}$ brick sides, 2 brick flat bottom, and 1 brick arch over, laid on concrete, the bends and connections being carefully made.

Boiler flue.

This flue is to be 3 feet 6 inches by 3 feet 6 inches in the clear, and to be carried up against the chapel wall, as shown, with a superficial area of 8 feet 9 inches, to be rendered inside with cement, and finished the same as other flues.

Art. 62. The ventilating flue from the kitchen is to be carried up against the boiler flue, as shown on the Drawing, and rendered with cement. The half-brick division wall is to be built in cement, with hoop-iron bond inserted every 2 feet.

Ventilating flues.

A channel in connection with this flue is to be constructed in the wall of kitchen 6 inches below the ceiling as shown.

The flues or channels in the walls for ventilation are to be constructed in the most careful manner, of such dimensions as are figured on the Drawings, or as may be directed during the progress of the work, and are to be rendered in all cases with cement.

Art. 63. Six-inch terra-cotta flue pipes to be built in the wall from the boilers or coppers at the end of the wash-house, to be carried vertically through the wall, as shown on the Sections.

Steam escape flues.

Art. 64. Raise all the chimney shafts and boiler shaft, as shown by the Drawings, and properly turn where necessary all flues, carefully gather the same over when required, or build in such a manner as to be most favourable for good draught, and carefully work to the form shown, or as may be directed; all the cappings and splays to be of stone.

Chimney stacks

Art. 65. Construct the chimney where shown on the Plan, and of the dimensions, form, heights, and thickness indicated on the Drawings, and to have in the entire height 14 tiers of brickwork in cement, each tier being 3 courses in height.

Boiler chimney to washhouse.

Art. 66. Form under ground floor corridor, in the position shown on Drawing, and of the form and dimensions shown and figured thereon, two duets to contain the pipes for warming, and other services connected with the building; to have 1-brick sides with two courses of footings, $\frac{1}{2}$ -brick arch in cement, leaving apertures for areas where directed, and pave the bottom with brick flat bedded solid in mortar, and properly grouted with liquid mortar. Twice limewhite the internal sides and arch, and strike the joints of brickwork fair for same.

Chamber for pipes.

Art. 67. Construct under each flight of steps from terrace four 9-inch walls in mortar, with two courses of footings to each, cut to form a solid bed for steps.

Terrace steps.

Cesspit for boiler-house.

Art. 68. Form a cesspit, as shown, for the reception of waste water from boiler-house, 10 feet by 5 feet steined in $\frac{1}{2}$ -brick, and domed over in $\frac{1}{2}$ -brick in cement, a core 2 feet in diameter to be formed up to general level, and covered with a 3-inch York stone, tooled both sides and edges, 2 feet 6 inches square.

The bottom of this cesspit to be 45 feet under datum level, and to be connected with a 9-inch drain carried to S.W. angle of site.

Rain-water tank.

Art. 69. Construct the underground rain-water tank where directed, and of the figured dimensions, to be built in brickwork in cement, and rendered up to the level of the springing of the arches with $\frac{1}{2}$ Roman cement and sand, $\frac{3}{4}$ -inch thick.

Turn arches $1\frac{1}{2}$ -bricks thick on strong centering, and puddle with clay well rammed to the back of the wall as shown.

Pavement lights.

Art. 70. Construct openings in the arches of wine and beer cellars, and provide York stone curbs rebated to receive pavement lights, 21 inches diameter, as shown.

Art. 71. Lay upon all walls of buildings, external and internal, except area and sleeper walls, 6 inches above the finished ground in all cases, Jennings' damp proof course, which will be provided by the War Department.

ASPHALTE.

The asphalt to be used is to be supplied and laid down by the Seyssel Asphalt Company, and is to be of the quality known as "Pyrimont Seyssel."

Entrance gateway.

Art. 72. Pave the entrance gateway with $\frac{3}{4}$ -inch asphalt, laid in two thicknesses, dressed close up to granite sills and raecers, and laid on a layer of fine concrete.

Flat over corridor.

Art. 73. The flats over main corridor are to be laid with $\frac{3}{4}$ -inch asphalt, laid in two thicknesses on fine concrete, with a shallow channel on each side, as shown, 6 inches wide, dressed close up to stone curb, and finished against the walls with a flashing of $\frac{1}{2}$ -inch asphalt, 6 inches high, and turned into wall.

Covered ways.

Art. 74. The covered ways are to be laid with $\frac{3}{4}$ -inch asphalt, in two thicknesses, on fine concrete, turned up against the curb on each side 2 inches.

Arches.

Art. 75. The backs of arches of wine and beer cellars, sub-way, and boiler house are to be laid with $\frac{1}{2}$ -inch asphalt, the asphalt being carried in all cases through the entire thickness of walls.

FIRE-PROOF FLOORS.

Fire-proof floors.

Art. 76. The arrangement of the wrought-iron girders and joists for the construction of the fire-proof floors is shown on the Detail Plans and Sections, numbered 98 to 104 inclusive. The girders and joists are not included in the general tender for the building, but will be supplied and delivered at the works by the patentee, Mr. Henry Barrett, 12, York Buildings, Adelphi; and the Contractor will have to hoist, arrange, and fix them, providing also the necessary angle-plates, labour, and rivets in drilling and connecting the joists and girders in the library and chapel, and in forming the floors, flats, and ceilings, as hereinafter described.

Each of the main wrought-iron girders in the library and chapel, and the four pairs of rolled girders for carrying walls, are to be on stone templates. In fixing the joists a firm and level bed is to be provided, so as to give them a true and uniform bearing on the walls, and for this purpose one double tier of hoop iron in three courses of brickwork in cement is to be laid under the ends of all joists throughout the building, except where continuous stone templates are provided. The long lengths of joists which are carried over internal walls will be brought to an intermediate bearing thereon by the weight of the concrete, and in order that the weight may bring them as nearly as possible to a true level, all the girders and joists will be slightly cambered.

The manner of connecting the joists to the girders in the chapel and library, viz., by short lengths of angle-iron, $\frac{3}{4}$ -inch thick, securely rivetted, is shown on Drawing No. 104. When the strips bear against the walls, rough fillets are to be plugged to the brickwork to receive them. In all the main wards where $8\frac{1}{2}$ -inch joists are used, the bearing is to be reduced by brick corbelling from 26 feet to 24 feet, as shown on the sections, and the ends of joists bedded on a chain of vat hoop iron $2\frac{1}{2}$ inches wide.

In forming the floors and flats, stout laths or strips, full 1 inch square, are first to be laid across from joist to joist on the lower flange; these may be rough sawn, but must be free

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from knots, placed $\frac{1}{2}$ inch apart; and every twentieth lath, giving about a 3 feet interval, shall be of increased scantling not less than $2\frac{1}{2}$ inches by $1\frac{1}{2}$ inches laid flat, for the purpose of securing the ceiling joists below; the laths when laid shall be first secured at their ends by a portion of fine concrete or rough mortar to keep them steady, after which the centre part shall be filled in. The concrete thus placed shall be brought to within 4 inches of its final thickness, the surface being left rough, though of an uniform average level. On this first layer shall be duly arranged and properly levelled the sleepers for securing the 2-inch joists of deal to carry the oak floors.

These sleepers are to be cut out of a solid scantling $5\frac{1}{2}$ " x 4", sawn in such a manner that they shall measure $1\frac{3}{4}$ " at top and $2\frac{1}{4}$ " at base, the top and base forming the whole dimension. Each sleeper, after being set level at the correct distance, &c., is to be firmly secured by being bedded in an additional layer of concrete to within $\frac{1}{4}$ -inch of its upper edge; this layer, and the former one beneath, forming together the entire thickness specified. If it should be thought any advantage to put the whole layer of concrete in one thickness, channels must be formed with a pick, of the required depth to receive the sleepers, which, after being placed level as before, shall be made good, and secured with concrete in their true position by well tempered mortar or fine concrete.

The whole surface of concrete is finally to be brought to joist level, with rendering of Portland cement.

The concrete is to be made of equal quantities of fine ballast or gravel and broken brick or tile, in pieces the size of a walnut, the whole well mixed with ground lias or other equally good stone lime, in the proportion of 7 of gravel to 1 of lime, to be laid in moist, and well trodden in. The thickness of the concrete to be as follows:—

Ground Floor.—8 inches generally, and 10 inches in ward staircases, bath room, and those wards where 8 inch and $8\frac{1}{2}$ -inch joists are used.

First Floor.—10 inches in all the wards; 8 inches elsewhere.

In the flats over provision stores and corridor the concrete will be laid to a slope of about $1\frac{1}{2}$ inches in 10 feet, to carry off the rain water, and will average about 9 inches in thickness. In laying the concrete both of floors and flats, a channel 2 or 3 inches wide is to be left round the walls, to allow for expansion during its setting. This channel is to be afterwards filled up. The basement ceilings of pavilions Nos. 1, 2, and 3, and the rear half of No. 4, are to be formed as follows:—After the concrete is dry, and before applying the pricking-up coat of the ceilings, the under side of the iron joists should be scraped with a knife to remove any loose scales of iron, and painted with a good coat in oil. The plastering forming the ceilings is then to be applied. The first or pricking-up coat of lime and hair to be of sufficient thickness to cover the flanges of the iron joists full $\frac{1}{4}$ -inch, and to be well pressed between the strips, so as to unite with the concrete above. The finishing coats of the ceilings are to be put on when the pricking-up coat is perfectly dry, and in the manner described in the Plasterer's work.

The remainder of the basement ceilings and the whole of the ground floor ceilings are to have lath and plaster counter-ceilings, which are to be attached to stout fillets or battens $1\frac{1}{2}$ inches square, and 12 inches apart, firmly secured to the strips or laths which carry the concrete. These ceilings should not be applied until the concrete is perfectly dry, and the soffits of the iron joists should be previously scraped and painted.

The detail sections show the construction of the floors and flats $\frac{3}{4}$ th full size, with the application of a boarded surface to the floors generally, one of tiles to the floor of corridor, and one of asphalt to the flats. The boarded surface is to be secured to light fir joists, 2" x 2", laid 12 inches apart, upon the level surface of the concrete as shown, with occasional struts 3 or 4 feet apart to stiffen them. The asphalt surface of the flats is to be laid to the slope of the concrete.

All ironwork contained in the floors is to be painted one coat in lithic paint, and one coat in common colour.

MASON.

Art. 77. All the stone is to be of the best quality, free from salt, vents, sand holes, and other defects, such as shells, cracks, &c. The strata to be the best, and the masonry generally to be subject to inspection and rejection in regard to material and workmanship if in any case it be found defective. The whole of the stonework is to be left in all respects perfect at the

Masonry generally.

delivering up of the building, and the Contractor must therefore take all precautions which he may deem necessary for protection from chipping or breakages, or other injuries by weather or by accident. Substantial scaffolding is to be provided and no material or workmanship is to be omitted which is necessarily connected with or implied in the proper completion of the work, as shown or intended on the Drawings or in the Specification. All stones are to be worked on the ground and set with lewises and proper tackling; the bonds, beds, and scantling of every stone are to be the full dimensions required by the Drawings, and every attention is to be paid to bonding the work in the most perfect manner.

The backs of the ashlar and dressings, which bond with the brickwork, are to be roughly drafted square with the beds. The beds and joints are to be what is termed half plain work, to be sunk wherever necessary to make good work, and no joint to exceed $\frac{1}{8}$ th of an inch in thickness.

The plain work to be true in all cases and out of windings. All the arrises and angles to be carefully kept, and the lines of the moldings, the curves and the mitres (which latter are in all cases to be worked out of the solid) are to be chiselled to their true form.

The Bath stone masonry throughout is to be finished with a fine dragged face.

Every stone is to hold its full length and height square to the back.

The horizontal beds of the dressings to jambs of doors and windows, pilasters, &c., are to be secured with one or more slate dowels, $1\frac{1}{2}$ inches square and 2 inches long, carefully fixed with cement.

The beds of all architraves to windows and openings, and the bearings on sills and heads, to be secured by one similar dowel.

Copings, blockings, and cappings of balustrades are to be secured by strong copper cramps, 20 inches long, one at each joint, let into the underside and run with lead, also lead plugs at each joint, and no stone to be less than 2 feet 6 inches in length.

The balusters to have a slate plug, $1\frac{1}{2}$ inches square and 3 inches long, let in at each end.

All arch joints are to have double lead plugs, and each arch bed to have a slate dowel, as before described.

All projecting cornices, cappings, and strings to have water joints run with lead.

Cut all grooves for lead flashings and asphalte fillets, and all mortices, chases, grooves, rail-holes, and sinkings that may be required.

Hooks and pivots for gate and door hinges, catches for latches, and for holding gates, doors, and windows open, to be let in where necessary in solid stone and run with lead.

GRANITE.

Plinth of gateway.

Art. 78. The plinth to entrance gateway, front and rear, is to be of Cornish or Devonshire granite, the base of each pier being in one stone, half plain beds, exposed faces wrought fair and weathered, as shown.

Fend stones.

Art. 79. To provide and fix at entrance gateway, 4 fend stones, in the position shown on Drawing No. 47, to be 18 inches diameter, 34 inches above the ground, and 26 inches under the ground line.

Provide and fix 4 fend stones against the curb adjoining the main road, 12 inches above ground, 10 inches in diameter, rounded on top, and 15 inches in the ground.

Sill.

Art. 80. The sills at gateway to be each in 3 stones, bedded in brickwork, 2 feet $4\frac{1}{2}$ inches wide by 9 inches thick, wrought fair on upper side and morticed to receive cast-iron gate standards.

Sill to cart entrance.

Art. 81. To put to the cart entrance a sill, 18 inches wide and 8 inches thick, to be in 3 stones, the exact size of the opening. Cut out mortice holes to receive the plugs at the bottom of the iron socket bases.

Steps to footways.

Art. 82. The steps to footways to be worked square, each step to be in one piece, 15 inches by 6 inches, worked fair on tread and riser, and to have 3 inches lap one over another.

The upper step, in each case, to be in breadth the full thickness of the wall.

Racers.

Art. 83. Provide and bed in concrete, in central gateway, curved racers, $12'' \times 6''$, tooled fair on upper side, the joints plugged with copper dowels, and a sinking, $2'' \times \frac{1}{2}''$, for wrought iron flat racer, which is to be let in flush and run with lead.

Curb to footway.

Art. 84. The curb to footway to be the ordinary road curb, $12'' \times 6''$, in 3 feet average lengths.

BATH STONE.

Art. 85. The Bath stone to be used throughout the building is to be of the best quality from the Box Quarries; certificates of the same are to be delivered with each cargo by the owners of those quarries, and no stone is to be left of a quality inferior to two samples deposited at the War Department prior to the commencement of the works.

Art. 86. The ashlarwork to entrance gateway to be worked in accordance with Drawing No. 28, no stone to bed less than 6 inches on the bed, and those forming the quoins are to be cut from solid stone, so as to show in their returns a width of 2 feet 6 inches at least. Through bondstones to be introduced every fifth stone. The whole of the ashlarwork to be secured by slate dowels, to be worked fair and rubbed on face and exposed edges, and to have the arrises of the rusticated work sharp and clean cut. Those parts shown as vermiculated are to be executed as shown on Drawing No. 38, with a chiselled draft, the other portions of the face being raised half an inch from the surface, and rough pointed with a chisel.

Art. 87. The several strings, plinths, &c., throughout to be worked according to the profiles, the face and exposed edges wrought fair and rubbed. No stone to be less in length than 3 feet, and all angle stones to be worked out of the solid.

Art. 88. The quoins at angles of buildings, wherever shown, are to be of the figured heights and widths, each quoin to be in two stones, with occasional solid stones for bond. Those shown with picked faces are to be worked in accordance with Art. 86.

Art. 89. The architraves, archivolt, imposts, pilasters, and key-stones, wherever indicated, are to be worked as shown by the red lines on the detailed Drawings, the whole of the stones to bear the full thickness throughout, to bed not less than 6 inches on the wall; all exposed parts to be neatly jointed, and the top and bottom stones of jambs to be rebated for the window frames.

Art. 90. The caps and bases of columns at ends of pavilions to be each in one piece, and the caps to be in accordance with the Drawing No. 44, worked fair and secured with slate dowels, as before described.

Art. 91. The shafts to be turned each in one piece, worked fair and smooth all round and dowelled as before described.

Art. 92. The sills to the windows of the upper story at projecting ends of pavilions are to be worked in lengths, each sill to be in not more than three pieces, the joints plugged and dowelled, and sunk, moulded, weathered, and throated as shown.

Art. 93. The cornice round front building and to the ends of all pavilions, as shown, are to be of Bath stone moulded as shown on the several Drawings, with trusses, blockings, &c. &c.; every stone to be properly plugged, and the external angles cramped with copper cramps, and fixed with two or more holding down bolts, to be finely dragged on all exposed faces and well bedded on the wall. No stone to be less in length than 2 feet 6 inches, and the Contractor is at liberty to work such cornices as he may think proper in one stone in depth.

Art. 94. The blocking course over the projections in rear of centre building and elsewhere, as shown, to be in stones of not less than 3 feet in length, worked fair over all external faces. Each stone to have on the horizontal joint one slate dowel, and the vertical joints one plug of the same description and size as before set forth, and to be set in cement.

Art. 95. The piers, bases, cornice, blocking, and sunk panels in attic over gateway are to be of Bath stone, sunk, weathered, moulded, bedded, and throated, as shown on Drawing No. 48, and worked and jointed as described for stonework of a similar description.

Art. 96. The cornice over corridor is to be worked in lengths, as shown on Drawing No. 43, to suit the dimensions of the window openings, to be channelled on surface for iron chain bar, and holed over each pier for inch square bolts built into brickwork.

Art. 97. The chimney caps throughout to be worked out of the solid, wrought fair on all exposed faces, to be well bedded on the brickwork; the flues to be carefully cored, and to be in one stone in depth.

Art. 98. The balusters throughout are to be of Bath stone all square in section as per Details, and secured with one slate dowel top and bottom.

Quality of stone

Ashlaring.

Strings, plinths &c.

Quoins.

Architraves, &c.

Caps and bases

Shafts.

Sills.

Cornices.

Blockings.

Attic

Cornice over corridor.

Chimney caps.

Balusters.

Pier caps and bases, and capping.

Art. 99. The caps of piers terminating the fence wall and terrace wall, the balustrading and capping, to be worked fair and of the profiles shown, the joints to be secured as before described, and morticed, and holed to receive lamp-standards and gas-pipes. The pier caps to be in one stone, and the balustrade-capping to be in not less than 3 feet lengths.

Window sills.

Art. 100. The sills to all windows are to be of Bath stone, sunk, weathered, and throated, dragged on all exposed parts, and tongued for sills of sash frames. Each sill to be in one stone of the figured dimensions, bedded in mortar, parallel with the face of the wall, projecting 2 inches, and the ears built into the wall at each side $2\frac{1}{2}$ inches. Where the sills are shown continuous with the strings they are to be worked according to the Drawings, moulded to the profiles shown, and sunk, weathered, throated, and tongued as before. No sill to be less in thickness than 7 inches, and to be weathered on an average to an angle of 30 degrees.

Carving.

Art. 101. The keystone head over entrance gateway is to be boldly executed, in accordance with a model or cast to be furnished by the Contractor.

The carving for the reception of clock face over entrance porch to Chaplain's quarters to be executed as shown, to be boldly cut in good relief, to the entire satisfaction of the Superintending Officer, in accordance with a sketch hereafter to be furnished.

PORTLAND STONE.

External steps, landings &c.

Art. 102. The stone used is to be from the Waycroft or Maggot Quarries.

The whole of the external steps and landings, and floors of porches, are to be of Portland stone, of the best quality, and certified as such in the manner described for Bath stone. All steps to bear the full lengths, widths, and thicknesses shown on the drawings, and where built into brickwork to be pinned in with cement. Each step to be 3 inches wider than the clear width of the tread, and to be wrought fair and rubbed on all exposed faces. The steps to terrace to be 18" by 5", in 6 feet lengths, and the joints secured with lead plugs.

Four inch rubbed landings, laid in mortar to current, on a concrete foundation, to the six basement entrances at ends of pavilions. These landings are to be each in two stones, 6 feet $4\frac{1}{2}$ inches by 5 feet.

Curbs and plinths to covered way.

Art. 103. Provide and set in mortar stone bases 12" x 10" x 10", under each column, worked according to detail shown on Drawing No. 73, sunk one inch for base of column, and tooled at front and top.

The stone curb between the bases is to be 7" x 5", set in cement, on a bed of concrete. The heading joints are to be secured with one slate plug in cement, 2 inches long and $1\frac{1}{2}$ inches square. These stones (except the closers) are not to be less than 2 feet 6 inches in length, and tooled at front and top, chamfered on the outer edge, and rebated for asphalt.

Ward staircases.

Art. 104. For these staircases see Article 213, under Joiners' work.

Central staircase.

Art. 105. The staircase to the centre Pavilion to have feather-edged steps, backjointed, worked fair all round, with moulded nosings, and of the scantlings shown on Drawing No. 52. The side flights to be securely pinned in at one end 6 inches with cement, morticed for stubs of girders as shown, and for iron balusters. The centre flight to be similarly morticed at both ends. The bottom step to be solid, pinned in at both ends into the brickwork with cement, and the top steps to be in breadth the full thickness of the wall.

Stairs to Officers' Quarters, centre building.

Art. 106. The stairs to Officers' quarters, in centre building, from ground to first floor, to be of the lengths and scantlings shown in Drawing No. 13, to have 2 inch back joints, and worked fair all over. Each step to be pinned into the wall 6 inches with cement, and the bottom steps to be solid.

Landings, internal.

Art. 107. The landings to the central staircase, and to the ground floor, whenever bedded solid on concrete, are to be 4 inches thick, the remainder 6 inches. To be in all cases worked fair, and rubbed on all exposed sides and edges, and moulded where shown to correspond with the nosings of steps. The 6 inch landings to be joggle-jointed and morticed where necessary for balusters. 2 inch rubbed Portland, set in mortar, 14 inches wide and 5 feet long, to be laid in each arched opening off the corridor on the ground floor, as a curb for tiling.

Corbels.

Art. 108. Provide and bed in concrete, Portland stone corbels under binders of chapel gallery, and under feet of principals of covered entrance to Museum. All to be chamfered, sunk, or moulded, as shown, having a bearing of 9 inches on the brickwork, and morticed for plugs, which are to be let in and run with lead. Also provide and build in corbels of approved design, and corresponding as near as possible with the caps of iron columns for securing the feet of iron brackets of covered way where abutting against brickwork. To be worked fair on all sides, and caulked for brackets.

Bases for stoves.

Art. 109. Provide and fix stone bases 6 inches thick in Officers' Library and Museum, likewise in bed-making room, where Nettleton's stoves are provided, of such dimensions as may be required.

Similar bases 9 inches thick to be provided for all staircase stoves, as shown in Drawing No. 76.

Hook stones.

Art. 110. Provide and build in piers of cart entrance, hook stones, 2' 6" x 1' 16 x 1' 0", tooled fair on exposed faces, and morticed for fangs of hinges. Also build in stones properly squared, 9" x 9" x 6", for securing all ends of iron bar railing or fence.

YORKSHIRE STONE.

All the Yorkshire stone required for the building is to be of the best quality, from the Parkspring Quarries, or other equally approved.

Templates.

Art. 111. The templates under all girders, rolled joists, shoes of iron roofs, feet of principal rafters, wherever shown, and for all lintels, where shown or considered necessary, to be of the figured lengths and thicknesses, morticed for the caulking and bedded in cement. Provide and build into the wall in cement in continuous lengths, to the two sides of all the principal ground floor wards, as shown on Drawing No. 55, 3-inch York templates. Similar templates, built in edgeways, into all window arches, as shown on the same Drawing, to carry the continuous template across the window openings.

Lay upon all girders that carry a wall above self-faced stone of the figured dimensions, built in cement, the outer edges tooled fair where exposed to view. In internal walls, the template to be in width the full thickness of the superincumbent brickwork, and in external walls to be within $4\frac{1}{2}$ inches of the face of the work. Provide and set in mortar, under feet of all iron carriages of ward staircases, 5-inch tooled York templates, 3' 0" x 1' 0", bedded solid on brickwork, and morticed for caulking, in the manner shown on detail of principal staircase. Also 3-inch rough York stone covers to all ventilating stoves, with holes cut for air and smoke pipes, as may be directed by the Superintending Officer.

Hearths.

Art. 112. The hearths to all kitchens to be 4-inch rubbed York, in one stone, bedded solid in mortar.

The front and inner hearths to all other fire-places are to be of $2\frac{1}{2}$ -inch rubbed York, to be respectively in one stone each, and to extend 18 inches longer than the clear width of the several openings, and 18 inches wide. The joints where the front and inner hearths meet, and the edges, to be properly squared and straight throughout, and laid level on the top sides with the floors.

Paving.

Art. 113. The paving throughout (except when specified to be of Portland or Granite) is to be of York, shown on plans by a blue tint, and when the under side is exposed, to be rubbed both sides. All corridors and passages in basement, floors of boiler-room, kitchens and offices, to be paved with $2\frac{1}{2}$ -inch rubbed York, laid on concrete as shown. The kitchen floor being likewise laid on damp proof course as shown. Open areas, cellars, stores, and bottoms of lifts to be $2\frac{1}{2}$ -inch tooled York. The joints (in all cases) to be rubbed the whole thickness of the stone, and to be back jointed to the flooring. In all cases where the openings have doors hung to swing, the paving is to be six inches thick (each opening filled in with one stone) and the patent hinges are to be let in and run with lead. All internal openings are to be laid $\frac{3}{8}$ ths of an inch above the level of the boarded floors, and no stone to contain less than 6 feet superficial, excepting closers.

Paving in wash-house.

Art. 114. Provide and bed solid in mortar on well rammed dry rubbish, properly levelled, 3-inch tooled Yorkshire paving to the wash-house, boiler-room, and engine-room, tinted blue on plan, to be jointed in cement, and laid with all proper currents to the channels which are to be constructed as indicated on the plan.

Curbs.

Art. 115. Provide and set a York curb 12" x 6" tooled fair, round the beer cellar shoot, as shown, to be bedded in the brickwork, the joints plugged, and rebated for cellar flap. Provide and set in mortar York stone curb, of the figured dimensions, tooled fair on upper side to the front of drying closet, and rebated for iron gratings. The joints to be rubbed and doweled.

Coal plates.

Art. 116. Provide and set to each of the coal cellars a slab 3 feet square and 6 inches thick, tooled fair, and rebated for coal plate.

Staircases.

Art. 117. The central staircase, communicating with the basement in chaplains', nurses', and orderlies' quarters, also lower flight in officers' quarters (front building) and stairs to boiler-room, are to have spandril steps, rubbed fair and back jointed as for other spandril steps already described, built into the wall with cement not less than 6 inches. Each step to be 2 inches wider than the tread and to be morticed for iron balusters, which are to be let in and run with lead. All steps in basement story, wherever shown, are to be solid steps of tooled York, bedded in concrete and rubbed where in connection with rubbed landings.

Landings.

Art. 118. The landings, except when specified of Portland, to be 6-inch York, joggle jointed and run with lead, and securely pinned into the wall, with cement, not less than 6 inches. 6-inch York to ground and first-floor corridor of front building, joggle jointed and run with lead. All the exposed surfaces, soffits, and edges to be rubbed fair and the edges of landings forming well-holes to be moulded where requisite to correspond with the nosings of steps.

Sinks.

Art. 119. Fix in the principal scullery a 7-inch sink, 6 feet long and 2 feet 6 inches wide, supported upon 3 York bearers, tooled upon each face, and both sink and bearers pinned into the wall with cement.

Cut out for sink trap and skirt round the back and end with $\frac{3}{4}$ -inch Bangor slate, 18 inches high, rubbed upon the face and edge and plugged to wall.

Fix in each of the officers' kitchens a 6-inch slate sink, 3 feet by 2 feet, with proper slate bearers and holes for sink traps, and similar sinks in each of the non-commissioned officer's quarters throughout the building, of suitable dimensions.

Provide and fix in pharmacy, dissecting room, and dispensary in accordance with the Drawings, slate sinks with rebated holes for sink traps and fixed on proper bearers.

Provide and fix in ward sculleries Jennings' white glazed earthenware sinks; fixed on wrought iron bearers, as shown in detail.

Water-tank.

Art. 120. Provide and fix 3-inch York lintels and curbs to all openings communicating with the filter beds and water-tank, as shown on Drawing No. 88, also 6-inch York stone tooled flagging over filter beds and space for pump, forming proper opening therein for same, and having two large iron flush rings fixed in the cover stone of the small filter chamber.

Chimney-pieces.

Art. 121. Provide 2-inch rubbed York chimney pieces to each of the officers' kitchens in the front building, fitted to the openings, with plain jambs and mantel projecting 15 inches.

PURBECK STONE.

Surface drains.

Art. 122. Provide and set in mortar, on a bed of concrete 9 inches thick, a Purbeck stone channelled course, as shown in light blue on the plan of drains. The stone to be 15 inches wide by 4 inches thick, properly sunk and straight on edge, laid with a fall to cess-pits. Also provide and set in mortar, on a bed of concrete, 9 inches thick, on the outside of the channel stone when next the curbs or walls of the buildings, and on each side of the channel stone when the courses are isolated, stone curbs, 9 inches deep and 4 inches thick, tooled on face and set straight; all joints to be close, and no stone to be less than 3 feet in length throughout, except for closers: the channel stones to be perforated where necessary for iron and stoneware gratings. Where rain-water pipes occur the channel course to be curved round the same.

Also provide No. 30 tooled channel stones where shown, for drainage of garden, 18 inches long by 18 inches wide, with curbs all round as before. Dish out for and provide, and let in the gratings, when required.

Index stones to drains.

Art. 123. Provide and lay where directed Purbeck index stones, 15 inches square and 4 inches thick, and laid on a bed of concrete, 18 inches square and 6 inches thick. Those over the junctions of the principal drains to be octagonal or circular,

18 inches diameter, and grooved with lines, indicating the directions of the drains over which they are placed, and the depth of the latter below the surface.

SLATER.

Art. 124. Slate all the roofs (except where otherwise described) with the best strong Countess slate, nailed with copper nails, laid so that every third slate shall overlap the first at least 3 inches, to be cut close to all hips, valleys, chimney stacks, ventilators, &c., the eaves laid double, and each slate secured by two strong copper nails.

Art. 125. The front and return sides of front building are to have sawn slate slabs, with 3-inch ridge rolls (Williams' patent) securely fixed, and made water tight, in accordance with Drawing No. 77.

Art. 126. Louvres, wherever shown, of slate are to be $\frac{1}{2}$ -inch rubbed slate, pinned into stone or brickwork with cement. The open ridges, wherever shown, are to be of $\frac{1}{4}$ -inch slate, rubbed both sides, with $2\frac{1}{2}$ -inch ridge roll, fixed with countersunk screws, as shown.

Art. 127. Wine bins to be two tiers in height, as shown on Drawing No. 77; bottoms to be inch slate, sawn fair both sides, with square edges, to have $4\frac{1}{4}$ -inch bearings on end and back walls, and $2\frac{1}{4}$ -inches at meeting joints on brick pier divisions. The bottoms to be inserted as the piers are built up.

Art. 128. The whole of the baths, with the exception of those for the orderlies' and nurses' departments, are to be of Rufford and Finch's best white glazed Stourbridge ware, 5 feet 3 inches long at top, 2 feet 4 inches wide, and 1 foot 11 inches deep.

These baths will be laid on $\frac{3}{4}$ -inch rough deal, edges shot with a lining of 7 lb. lead, turned up 6 inches all round, and bedded in concrete as shown in detail.

All the baths are to have $\frac{1}{2}$ -inch enamelled slate fronts, securely fixed.

Art. 129. The slate partitions shown on the drawings are to be 1 inch thick, rubbed on both sides, fixed in cast-iron galvanized cappings according to Drawing No. 78. All exposed slate work in baths, urinals, sink skirtings, &c., where not enamelled, to be oiled and well rubbed.

All vertical joints to have copper tongues and grooves.

The divisions in bath-house to be let $\frac{1}{2}$ an inch into wood floors, and run with cement.

Partitions in bath-house to be rebated for slate doors, and a small fillet of India-rubber screwed into the rebate. The doors are to be hung with brass hinges as shown in detail, and are to have 4-inch brass bolts, large porcelain handle knobs, two porcelain hat pins with screwed ends and nuts, all secured with brass screws.

Art. 130. All the water-closet cisterns to be of sawn slate, with $1\frac{1}{4}$ -inch sides and $1\frac{1}{2}$ -inch bottoms, grooved as shown, and put together securely with galvanized-iron bolts, the bolt heads to be let in and properly covered as shown in Drawing No. 77.

Art. 131. Two of the provision stores are to be provided with two tiers of shelves of $\frac{3}{4}$ -inch slate, rubbed on one side and with rounded edges, built 2 inches into the brickwork, and supported by light cast-iron brackets under all joints, which are to be copper-tongued and grooved. The lower tier is to be 2 feet 6 inches clear in width, and the upper 1 foot 6 inches.

Provide and secure to oak plugs with strong flat headed screws, a skirting of $\frac{1}{2}$ -inch rubbed slate, 6 inches high round each tier of shelving.

Art. 132. Provide and securely fix to brickwork at the Communion end of chapel two enamelled slate slabs, 1 inch thick, with the edges gilt, and of the profile shown on Drawing. The slabs to have the letters of the Commandments cut and gilt.

Art. 133. The washing slabs to all wards, as well as those to operating theatre, pharmacy, dissecting-room, and wherever shown on Plans of centre building, are to be 1 inch white-veined marble, in one piece, finely rubbed and polished on one side, with rounded edges and corners, and perforated and rebated as shown. These slabs are to have $\frac{1}{2}$ -inch skirtings of the same material, securely fixed to wall, and to have perforations in the same for cocks.

Art. 134. Provide and fix in the corridor, as covers to pipe coils, slabs of $1\frac{1}{2}$ -inch slate, finely rubbed on upper side, with rounded edges, and of the dimensions figured on Detail No. 76; to be in one piece and grooved, as shown, for iron casing.

The number of these slabs required is 20.

Vapour bath.

Art. 135. Construct the vapour bath, in accordance with Detail No. 78, with two thicknesses of 1 inch slate, the interspace being filled in with sawdust. Rub all exposed surfaces.

Art. 135A. Provide slate linings, fronts, and safes to Jennings' urinals, as per Detail Drawing.

CARPENTER, JOINER, AND IRONMONGER.

Art. 136. The Contractor is to provide all materials and workmanship, and to frame, fix, and finish everything necessary for the complete execution of the work, with ironmongery of every description, and all appurtenances required, omitting no materials nor workmanship which are connected with or implied in the proper completion of the works, as shown or described in the Drawings or Specification.

Art. 137. All timber is to be of the very best description from Memel, Riga, or Dantzic, sawn die square and free from sap, knots, or shakes, and, where possible, to be in one length. The oak to be Dantzic, well seasoned, and free from sap, shakes, and waney edges.

The deals and battens to be of the best description, Christiana or Memel, perfectly seasoned, free from sap, shakes, loose and large knots, and perfectly dry.

Art. 138. The ironmongery is to be of the best description and quality, to be fixed with screws, and all brass work with brass screws.

Specimens of locks to be seen at the War Office, Pall Mall. The Contractor is to provide and fix all requisite spikes, nails, screws, wall hooks, and all necessary and proper ironmongery and brass work. All hinges not otherwise described are to be of wrought iron.

The whole of the carpenter's work is to hold the scantlings specified when finished; the joiners' work to hold the several thicknesses hereinafter described, with the usual allowance for working, and to be fitted in the most workmanlike manner, with all appurtenances complete, as may be directed.

All timbers are to be laid truly level to prevent unnecessary thickness of plastering, or to prevent the scribing of the joiners' work. The principal timbers are to be laid upon the walls as much as possible, but in no case less than 9 inches; none of the timber in the joists, rafters, ceiling joists, or quarters, &c., to be more than 12 inches apart.

Art. 139. All bonds and plates are to cross each other at the angles and to extend beyond as much as possible. They are to be dovetailed and pinned together with oak pins.

The crossings and laps are to be scarfed and wedged, and pinned or spiked together.

Art. 140. Provide all centering to arches for vaults, groins, cambering, and discharging arches over all door and window openings, and wherever else requisite, including casing and removing when done with. All centering to become the property of the Contractor after use. No centering is to be removed until the Clerk of Works or Superintending Officer shall direct the same to be done.

Art. 141. Provide all moulds for cast and wrought iron work, copper and stone work, to be used in the building. Such moulds to be prepared and submitted to the Superintending Officer or Clerk of Works for approval, previous to the casting or performing the work of each description.

Art. 142. Provide and fix all temporary inclosures which may be required for doors and windows, &c.; also, all hoards, shores, ties, struts, and boarding for protection of masonry, and shoots for rain water, &c., which may be required. Provide turning pieces to chimneys, struts, carriages, or other necessary supports; also, cut holes, dishings, and other works required by the plumber and other trades. Provide all rods, moulds, rules, laths, trammels, and other implements of every description for the use of the several workmen, and make good after them whenever required, and perfect any parts that may receive injury. Fix all smith's work as far as connected with the carpentry.

Art. 143. Provide oak bricks for the proper fixing of the joiners' work, &c.; none to be placed within 9 inches of any flue. The door openings to have twelve oak bricks, four of them being in the arch. Twelve similar oak bricks to all openings having wood finishings. Put fir templates where necessary under beams, binders, breastsummers, beams, purlins, and other timbers which do not rest upon plates on the wall, or when stone templates have not been previously specified.

Art. 144. Provide and lay down to all wood floors, plates and joists of Memel, Riga, or Dantzic.

Plates throughout for joisting, $4\frac{1}{2}" \times 3"$, except where otherwise figured on the drawings.

Joists throughout to be not more than 12 inches apart, and strutted every six feet.

Lintels of yellow fir over all door and window openings requiring them; 1 inch in thickness for every foot in width of opening. The lintels to be equal in width to the thickness of internal walls; and in external walls equal to the thickness of such walls, measuring from the back of the arch.

Art. 145. The girders, binders, bearers, wherever shown, to be wrought and beaded, or stop chamfered, wherever exposed to view, or to be cased with inch deal beaded, and proper backings, where so indicated on the drawings.

The ends of girders, &c., to be secured to York templates, as specified under Mason's Work, with two wrought-iron pins, 1 inch diameter, 4 inches long, let into fir, and when let into stone to be run with lead.

Art. 146. Flooring of rooms, passages, lobbies, and water-closets, day-room and itch ward, also all landings on first floor of pavilions throughout the building, except wards and lobbies at end of wards, to be $1\frac{1}{2}$ -inch yellow deal batten floors, wrought, ploughed and tongued with hoop-iron, to be No. 15 B W gauge, and to be coated with oil before being fixed in the flooring. The flooring to be nailed to the joists wherever shown, or to deal fillets $2" \times 2"$, as shown on the drawings of Fox and Barrett's flooring attached.

Curbs round hearths throughout to be of oak, $4\frac{1}{2}$ inches wide, wrought and mitred, and nailed with flooring brads, weighing 20 lbs. per 1,000.

Art. 147. The flooring of all wards and lobbies at end of wards, except day-room and itch ward, to be $1\frac{1}{2}$ inch, wrought, ploughed, and tongued wainscot floor, in batten widths nailed to deal fillets $2" \times 2"$, as before described, with cut floor brads $3\frac{1}{2}$ inches long.

All flooring to have tongued headings, and to be laid straight joint. Provide in the day-room floor, and in all ward floors that carry horizontal smoke flues, one width of cross boarding, fixed with $2\frac{1}{2}$ -inch countersunk screws, for each flue pipe. Such boarding to be of the same materials as the flooring, and to have an oak curb $4\frac{1}{2}$ inches wide on each side.

Curbs round stoves to be of oak $4\frac{1}{2}$ inches wide, wrought and mitred at angles, and with fair joints to all slabs.

The curbs to well holes of ward staircases are to be of wainscot, $7" \times 3"$, wrought, moulded as steps, and rebated to receive the flooring, secured to deal flooring with $\frac{1}{2}$ -inch wrought iron dowels not less than 9 inches in length.

Art. 148. All trimmer-joists to be one inch thicker than the joists.

Art. 149. The ceiling joists to be of the figured dimensions, to be spaced 12 inches in the clear, and secured to fillets at the ends.

Art. 150. The several roofs to be framed in the manner and of the scantlings shown on the drawings; to be of the best Memel, Riga, or Dantzic; to have wrought-iron straps to king and queen posts, and for feet of all principal rafters to be $2" \times \frac{3}{8}"$, fixed with screwed ends, as shown in drawing.

All hips to have angle ties and dragging pieces $6" \times 4"$, and the wall plates to be connected through the flues by iron straps, $2\frac{1}{2}" \times \frac{1}{2}"$.

In the ward, staircase, and other roofs, where binders are shown for attaching the ceiling joists, iron shoes are to be provided, dropping over the tiebeam and the ends of binders resting therein.

Art. 151. Provide and frame cornices of yellow deal, wrought one side, grooved and rebated, as shown on detail Drawing No. 51, to all buildings except front building and ends of pavilions.

Art. 152. The chapel roof is to have 6 wrought-iron framed principals, with intermediate and transverse girders framed therein, forming panelled ceiling, as shown on Drawing No. 33.

The main ribs are to be continued down to the top of pilasters, with bracketing, 3 inches thick, framed into face of wall and girder. The ribs are to have framed and mitred mouldings of the dimensions figured on the drawing, the panels being filled in with $\frac{3}{4}$ -inch matched and chamfered boarding laid diagonally.

Plates, joists, and lintels.

Girders, bearers, binders, &c.

Flooring, generally.

Flooring to Wards.

Trimmer joists.

Ceiling joists

Roofs.

Cornices.

Chapel roof.

Materials and workmanship.

Timber.

Ironmongery.

Bonds and plates.

Centering.

Wood moulds.

Temporary supports.

Oak bricks.

Roof boarding.

Art. 153. Provide and fix to all roofs, except pharmacy and bath-house, $\frac{3}{4}$ -inch yellow deal boarding, edges shot, with all necessary tilting fillets of deal. The boarding of all roofs to wards to be covered with McNeill's asphalted felt.

The roofs of pharmacy and bath-house to have $1\frac{1}{4}$ -inch ploughed, tongued, and chamfered boarding, wrought on under side. The purlins and ridges to be wrought and stop-chamfered.

The boarding to roof over wash-house and ironing-room to be $1\frac{1}{4}$ -inch yellow deal, matched and beaded on one side, with all necessary tilting fillets of deal. The spandril ends of louvred ventilators to be enclosed with similar 1-inch boarding, wrought both sides for lead covering. The boarding to remainder of wash-house roof to be $\frac{3}{4}$ -inch rough deal, edges shot.

Boarding to flats and ventilators.

Art. 154. The flats upon which lead is to be laid are to be covered with $1\frac{1}{4}$ -inch yellow deal, edges shot and thickened with 2-inch rebated drips when necessary. The flats to have a current of not less than $1\frac{1}{2}$ inches in every 10 feet, formed by joists of diminishing depth, and no furrings to be introduced in any part.

Put 2-inch rounded rolls to all flats, not exceeding 2 feet 9 inches apart.

Rolls.

Art. 155. Rolls to ridges and hips throughout, except where slate is adopted, to be $2\frac{1}{2}$ inches diameter, secured by proper irons.

Gutters.

Art. 156. The gutters and valley gutters are to be of $1\frac{1}{4}$ -inch deal, well secured to proper bearers, the bottoms laid to a current of 2 inches in every 10 feet, with 2-inch drips. The vertical sides of gutters are, where necessary, to be formed with inch deal on strong backings. $1\frac{1}{2}$ -inch dove-tailed cesspools 18 inches long, the full width of the gutter, and 6 inches deep, with holes cut and rebated for socket-pipes, are to be fixed to gutters where shown.

Cradlings and coverings.

Art. 157. Fix sufficient ribs, with joists, cradling, bracketing, &c., wherever required, for plaster soffits, fascias, coverings, and cornices over girders, or wherever else required. The cradling is to be fixed to wood flitches, which are to be bolted together through the girders.

Quarter partitions.

Art. 158. The partitions between orderlies' rooms and passage, also partitions to non-commissioned officers' quarters off central staircase, and to dissecting-room, to have heads and sills $5'' \times 4''$, posts $5'' \times 4''$, braces $5'' \times 3\frac{1}{2}''$, quarters $5'' \times 2\frac{1}{2}''$.

Framed and trussed partitions.

Art. 159. The framed and trussed partitions in front building to be as shown on Drawing No. 35, and of the scantlings figured thereon.

Art. 159 A. The partitions in nurses' dormitories are to be the whole height of story, with glass fanlights over door, and moveable sash as shown in detail.

Sash frames.

Art. 160. Provide and fix sash frames to all ward window openings of wainscot, in accordance with Drawing No. 62, prepared for $2\frac{1}{4}$ -inch wainscot sashes, with English oak sunk sills rebated, sunk and weathered and ploughed for lead tongue between oak and stone sill, fixed in sill with white lead, 1-inch wainscot inside and outside linings, the outside lining stopped and rounded off within 1-inch of sill, and 1-inch wainscot pulley-styles tongued to outside and inside linings, $\frac{1}{2}$ -inch wainscot parting bead, $\frac{1}{2}$ -inch deal back linings framed to outside and inside linings, $\frac{1}{2}$ -inch pendulum slips, leaving $\frac{1}{8}$ -inch on each side for boxing to play and nailed to groove in head, 1-inch pocket pieces 2 inches wide let into centre of pulley style, under-cut and rebated at top and squared at bottom 6 inches above the sill, 20 inches long, the inside beads to be of wainscot $1\frac{1}{2}$ inches wide by $\frac{3}{4}$ -inch thick, pulley styles grooved and wedged in sill, nailed and grooved head, double hung with 2-inch brass framed pulleys, inside of oak sills to be sunk $\frac{1}{2}$ an inch as a key for cement apron.

The remainder of the sash frames throughout the building, except to boiler room, engine house, and coal store, are to be Memel deal-cased frames, prepared for 2-inch sashes, with English oak sunk sills, rebated, sunk, weathered and ploughed for lead tongue between oak and stone sill, fixed in sill with white lead, inch deal inside and outside linings as before, 2-inch deal beads and $1\frac{1}{4}$ -inch pulley styles, tongued to outside and inside linings, $\frac{1}{2}$ -inch parting beads, $\frac{1}{2}$ -inch back lining nailed to outside and inside linings, $\frac{1}{2}$ -inch pendulum slips, leaving $\frac{1}{8}$ -inch each side for boxings to play, and framed to groove in head, and 1-inch pocket pieces, 20 inches long by 2 inches wide, let into centre of pulley style, undercut and rebated at top, and squared at bottom, 6 inches above the sill. The inside beads to be $1\frac{1}{4}$ inches wide by $\frac{3}{4}$ -inch thick, pulley styles wedged and

grooved in sill, nailed and grooved head, double hung with 2-inch brass framed pulleys inside of oak sills, to be sunk $\frac{1}{2}$ -inch when cement aprons or slate window boards are shown. All to be well seasoned yellow deal.

Art. 161. Provide and hang to all ward windows $2\frac{1}{4}$ inch Sashes. Dantzie oak sashes, bevelled bar, as shown on Drawing No. 62, dowelled and bevelled at meeting bar, prepared to hang double, with strong patent copper line, sufficiently stout to fill the sheave of pulley box, and secured with cast-iron sash weights. All bottom sashes to be stopped 2 inches from head of sash frame, and to be fastened with the best patent spring roller fastenings, one to each window, and to have two strong brass sash lifts to lower sash, and proper lines and pulleys for opening and closing the top sash.

The remainder of the sashes, except to where shown otherwise in detail on the several Drawings, or where iron sashes are specified, are to be 2-inch Memel yellow deal bevel bar sashes, dowelled and bevelled at meeting bar, prepared to hang double with best patent sash line and cast-iron weights, as above described, fastened with one best patent spring fastening to each window.

All windows, door panels, or fan-lights, glazed with plate glass, are to have the glass secured by a wainscot moveable bead or moulding, as shown, with brass screws and collars.

Art. 162. Provide and fix to all fan-lights over external doors of wash-house building 2-inch bevel bar sashes, or transom lights, all to be hung on brass pivots, and to have sets of lines and fastenings for opening and securing the same.

Transom lights.

Art. 163. The windows to boiler room are to have 2-inch Boiler-room windows. deal bevel bar sashes, double hung as before described, and to have sets of lines, pulleys, and fastenings for opening the same.

Art. 164. The windows to the six pavilion staircases are to be 2-inch bevelled bar, fixed as casements, and with weathered and beaded transoms, as detailed on Drawing No. 63. One casement in each staircase is to be made to open as a door, with $1\frac{1}{2}$ pair of 4-inch wrought butts and ispagniolett fastening, as shown.

Ward staircase windows.

The semi-circular lights in the staircases are to be hung on hinges to fall back, and to have lines, pulleys, and brass fastenings for opening and closing the same.

Art. 165. The sashes of central staircase and chapel are to be of cast-iron, and of the section shown, bedded in the brickwork, and built in with cement.

Central staircase and Chapel windows.

Each octagonal pane in the staircase windows is to be made to open, hung on pivots, and connected so as to open simultaneously by means of a vertical lever, with proper fastenings for securing the same when open or closed.

The chapel windows are to be similar, with panes made to open as shown, hung as those to staircase windows, with proper lines, pulleys, and brass fastenings for securing them.

Art. 166. The skylights to operating theatre are to be 2-inch wrought deal, glazed with rough plate glass, $\frac{1}{2}$ -inch thick, to be in every respect in accordance with the detail Drawing No. 60, and to have sets of lines and brass fastenings for opening and shutting the same.

Skylights to operating theatre.

Art. 167. The roof lights in pharmacy to be 2-inch level bar fixed, glazed with rough plate glass, $\frac{1}{2}$ -inch thick, and of the dimensions figured on detail Drawing No. 34.

Lanterns and skylights to pharmacy and lunatic wards and dead house.

Form in flat over corridor to lunatic wards a skylight of the dimensions figured, 2-inch bevel bar, glazed with rough plate as before, with proper deal curbs as figured, $1\frac{1}{4}$ -inch tongued, and staff-beaded inside linings, and small deal moulding round inside of skylight.

The lantern of dead-house to be framed as shown, with wrought and framed angle posts $4'' \times 4''$, intermediate do. $4'' \times 3''$ grooved for louvres, plate $4'' \times 3''$; and to have metal sash bars, $1\frac{1}{2}$ -inches deep, screwed to framing.

Provide and fix on the four sides of lantern, louvres of inch-wrought deal, splayed both ends. The top to be glazed with rough plate as before, and the soffit lined with $\frac{3}{4}$ -inch matched and beaded close boarding.

Art. 168. The windows of bath house, and the corresponding ones in the pharmacy, are to have 2-inch semicircular sashes, hung with hinges, with lines, pulleys, and brass-hook fastenings to open the same.

Windows of bath house.

The frames to be solid, as shown, with oak sills.

Art. 169. Provide for six windows of provision stores in kitchen, block, skeleton shutters of $1\frac{1}{2}$ deal, prepared to receive wove fly wire-lattice, at prime cost of sixpence per superficial

Casements to provision store.

foot, hung with Parliament hinges as an ordinary shutter, and with two 6-inch bright bolts and wall fastenings to fit proper frames, 5' x 4", and oak sills 5" x 3½". See Drawing No. 56.

Fixed lights in partitions.

Art. 170. Provide and fix in partitions to non-commissioned officers' quarters, off central staircase, fixed lights of 1½-inch deal, 4 feet by 3 feet, secured to linings with 1-inch rounded deal, to have inch framed chamfered grounds, and 1½-inch rounded window boards.

Lights in nurses' rooms.

Art. 171. Provide and fix to all ward nurses' rooms 1½-inch deal moulded sashes, 2 feet by 1 foot 6 inches, made to open, hung to 1½-inch framed and rounded linings, in width the full thickness of the walls, fastened with a small brass fastening, and glazed with 2nds crown glass in one sheet.

Lifting sashes off kitchen.

Art. 172. The sashes between kitchen and central staircase are to be 2-inch deal sashes of the same description as others throughout the building, but single hung and with 2½-inch oak sill, wrought, double-rebated, and double-beaded.

Ward casements.

Art. 173. The large casements at ends of wards are to be 2½-inch wainscot bevelled bar in solid frames, as shown on detail Drawing No. 62.

To have wainscot turned shafts, moulded caps and bases, and moulded and rebated transoms. Those at the west end of main corridor are to be of similar description, but of deal.

To be glazed with polished plate glass, ¼-inch thick, secured by moveable wainscot beads with brass screws and collars, as specified for ward windows; to be hung with 1½ pair of 4-inch wrought butts, and secured with espagnolette fastenings dropped in, let into socket in oak sill.

Corridor casements.

Art. 174. The corridor casements are to be 2-inch deal ovolo moulded in fir, solid wrought and rebated frames, as per detail Drawing No. 43, hung with 1½ pair of 4-inch wrought butts, 1 leaf of each casement to be hung with 1½ pairs of knee-butts so as to fold back as shown, to have metal water bar, and to be secured with espagnolette bolt as shown. To have a deal architrave moulding, 6 inches girt, 1½ inch tongued and rounded window boards, with returned ends and deal moulding under, as shown on Drawing.

Doors and frames generally.

Art. 175. The middle rails of all internal doors are to be prepared with two double tenons, to receive the mortice locks where specified.

The bottom rails of all doors are to be prepared with 2 double tenons at each end.

The jambs in all walls of 14 inches and upwards in thickness, except where plaster is shown or specified, to be framed in panels to correspond with the adjoining doors.

The mitres of all architrave mouldings to doors and windows (except O'Gees) to be cross-tongued with wainscot.

All external door frames are to be put together with white lead and to have cast iron shoes, sunk half an inch into the door step, and run with lead.

Provide and fix door frames to all external door openings to all the buildings, 5" x 4" (except where otherwise shown in detail), wrought, framed, rebated, and beaded for 2-inch doors, prepared for fan-lights over doors, where shown, with wrought, framed, double rebated, weathered, chamfered, or beaded transom, and moulded where shown.

All external door frames to be set back 9 inches from the face of the wall.

Provide and fix door frames, 5" x 4", to all internal double door openings, and where the walls are not plastered, beaded or moulded at angles as shown.

The door openings of wards to have solid frames, 6" x 3", wrought, framed, double beaded, and hollowed out for swing doors, as shown on Drawing No. 55, with moulded transom and segmental head. Spuds and rings as before.

Art. 176. The entrance door to chaplain's quarters to be 2-inch yellow deal in four panels, the two upper ones filled in with polished British plate glass, ½-inch thick, and secured with moveable oak moulding, and brass screws and collars, bolelection-moulded outer side, and bead flush on the other, and with three best 5-inch wrought butt hinges and stout screws. To have 8-inch bright rod bolts at bottom, and 18-inch ditto at top, dropped into iron sockets, leaded into stone sill. To have a 10-inch fine iron rim draw-back lock with round wards, brass handles and side plates on both sides, solid bow key, lettered and marked W.†D.

The remainder of the external doors to be 2-inch yellow deal, panelled as shown, bead flush and square, except where shown otherwise in detail or described. Those that have the upper

panels glazed with plate glass will have wainscot moveable beads, secured with brass screws and collars, as before described. They are to have 10-inch fine iron rim draw-back locks, with round wards, brass handles and side plates on each side, with escutcheon fixed to doors with strong round headed 3-inch full cut screws, to have solid bow keys, lettered and marked W.†D., and no key to pass a second lock; to be kept open, when necessary, by self-acting brass back-fasteners.

The doors to boiler-house, coal store and wash-house to be hung folding, and to be 2½ inches thick. The doors in rear of front building are to be 2-inch four panel, bead flush both sides, the upper panels filled in with polished plate glass as before, hung with 1½ pairs of 5-inch wrought butts, and furnished with an 8-inch iron rim two-bolt lock, and two 10-inch barrel bolts, and brass furniture. Doors to orderlies' day-room and staircase to be 2-inch two-panel bolelection-moulded and bead flush, with hinges, locks, and fastenings as above. All external doors to be provided with brass mortice latches and bronzed handles.

Art. 177. The doors of all the main wards throughout, and day-room, are to be 2-inch wainscot, hung folding, to swing both ways, each door in two panels, moulded and bead flush, the upper panels prepared for polished British plate glass, ½-inch thick, bedded in wash-leather, with wainscot moveable fillets round glass, fixed with brass screws and collars; 2-inch wainscot fanlights over, with segmental heads, glazed with plate as before, beaded at angles, and hung on brass pivots with lines and fastenings. Each fold of these doors is to be hung with Smith's centre hinges, and to have a 9-inch cranked bronze handle, of an approved pattern. Also a plain bronze finger-plate, 18 inches long, upon the opposite side.

Art. 178. The doors to all ward water-closets, passages, and lavatories, also to nurses' rooms and sculleries, are to be 2-inch four panel, bead flush and square, hung with three 4-inch wrought iron butts and stout 2-inch screws. The doors leading from lobbies to water-closets are to be hung with Smith's patent spring hinges, and to have a large white Porcelain knob handle fixed on both sides.

The doors leading from lobbies to lavatories are to be hung with 4-inch wrought iron butts, and to have 6-inch mortice latch, with large bronze handles. The nurses' rooms and scullery doors are to have 8-inch two-bolt round ward locks, with hard wood knobs.

Art. 179. The doors in corridor are to be as per Drawing No. 55, hung to swing, and furnished similarly to ward doors. The upper panels are to be filled in with crown glass, 2-inch ovolo fixed side-lights and fanlights over, with moulded transom as detailed. The framing of these doors is to be well secured at bottom by wrought-iron dowels with strap ends, the dowels being let into stone paving and run with lead, and the strap end let flush into framing and screwed. The framing is further to be secured in its height by wrought-iron holdfasts driven into the brickwork, and secured to the framing.

Art. 180. The doors to separate and offensive wards are to be 2-inch four-panel doors, bead flush and square, and hung with three 4-inch wrought butts, 8-inch two-bolt rim lock, with hard wood furniture.

Art. 181. The doors to operating theatre and operating ward are to be 2-inch four-panel doors, moulded and bead flush, hung with three pairs of 4-inch wrought butts, 8-inch two-bolt mortice lock, with hard wood furniture.

Art. 182. The doors to nurses' water-closets, and all other water-closets throughout the building, excepting in orderlies' quarters, are to be 1½-inch two-panel square doors, with segmental heads wherever shown, and to have brass pulpit latches and 6-inch brass rod bolts.

Art. 183. The doors in basement, viz.: Doors to non-commissioned officers' quarters, dispensary, dispenser's quarters, provision stores, and officers' kitchens, are to be 2-inch four-panel square doors, with 8-inch iron rim locks, two bolts, and hard wood furniture. The doors to water-closets in basement are to be 1½-inch four-panel square doors, hung with 3½-inch wrought butts, brass pulpit latches, and 6-inch brass rod bolts, and hard wood furniture.

The doors of kitchen, pack-store, and other stores, are to be 2-inch four-panel square doors, with 10-inch iron rim locks, two bolts, hard wood furniture.

The wine, beer, and coal cellar doors are to be 2-inch, framed, braced, and ledged, filled in with inch yellow battens, matched and beaded both sides, and hung with three 4-inch cast-iron butts. Each wine and beer cellar door is to have a strong best-

Doors, internal.

Doors to water-closets and lavatories.

Corridor doors.

Doors to separate wards.

Folding doors.

Nurses' water-closet doors.

Doors in basement.

Doors, external.

fitted pipe key wine-cellar lock, with metal bolt and ward, P.C., 15s. each.

Doors to coal stores to have 8-inch wood stock locks.

The doors of dissecting room and dead-house are to be 2-inch six-panel bead flush, and square doors with 8-inch two-bolt iron rim lock, hard wood furniture, and two 6-inch bright rod bolts.

The internal doors of board-room are to be 2-inch four-panel belection-moulded and bead flush, hung with three 4-inch brass butts, and to have a 7-inch two-bolt mortice lock porcelain furniture, and porcelain finger plates on one side only.

The doors of officers' library and museum are to be 2-inch four-panel, hung folding, with three pair of 4-inch brass butts, moulded and bead flush, and to have 7-inch best mortice lock, with brass furniture, and two brass flush bolts, one 9 inches long, the other 24 inches.

The doors to small offices adjoining museum and board room are to be similar in every respect to those of ward nurses' rooms, with similar fastenings and furniture.

Art. 184. The entrance doors to chapel and hospital library are to be 2½-inch, with raised panels, as shown on detail Drawing No. 58, moulded both sides, and hung folding with three pair of 5-inch brass butts, to have a 7-inch mortice lock, with hard wood furniture and flush brass bolts, 18 inches at top and 9 inches at bottom.

Art. 185. The doors to all offices and officers' quarters on the ground and first floors of front building are to be 2-inch six-panel, moulded both sides, as per Drawing No. 54, hung with 1½ pair of 4-inch wrought butts, and to have a 6-inch two-bolt iron rim lock, with hard wood furniture and hard wood finger plates.

Doors next to rooms having square skirtings are to have the sides next rooms square, and between rooms with square skirtings in each to be square both sides.

Art. 186. The doors to orderlies' rooms are to be 2-inch four-panel square doors, as shown on Drawing No. 54, hung with one pair of 5-inch wrought-iron butts, and to have an 8-inch rim lock, with two bolts and brass furniture.

The doors to orderlies' water-closets are to be 1½-inch two-panel square doors, hung with 4-inch wrought butts, and with a 4-inch round-japaned bolt to each.

The doors to officers' servants' rooms and nurses' rooms are to be 2-inch six-panel doors, moulded and square, hung with 1½ pair wrought butts, 7-inch two-bolt rim lock, and hard wood furniture.

The door to clean linen store is to be similar to that before described for officers' library door, except that it is to be bead flush and square, hung with 4-inch wrought butts, and to have a 7-inch stock lock.

The doors to lifts are to be 1½-inch four-panel bead butt and moulded doors, except in basement, which are to be square both sides, all hung folding, with 3½" wrought butts, and fastened with two 6" rod bolts, and brass turn buckle, with large knob handle.

Art. 187. The entrance doors to waiting-room and to orderlies' day-room to be 2-inch, as shown on Drawing, to be hung with 5-inch wrought butts, and to have each a 9-inch draw back lock, with brass furniture, and two 10-inch bright barrel bolts.

Door to porter's room to be similar, but to be provided with a 7-inch stock lock.

Art. 188. The doors to foul linen shafts on ground and first floors are to be 1½, framed in two panels, as shown on Drawing No. 83, and furnished accordingly with turn buckle as described for doors to lifts, and also to have a 3-inch brass lock, with all keys to differ. The doors to foul linen chambers in basement to be 1½-inch four-panel square doors hung with 3½-inch butts, and fastened with turn buckle and 5-inch brass lock, with all keys to pass.

Art. 189. The doors to ward water-closets to be 1½-inch, bead flush and square, in two panels, hung with 4-inch brass purpose-made butts, fixed to iron uprights as shown, and to have a strong brass water-closet latch.

Art. 190. The internal doors in washing establishment to be 2-inch framed, braced, and ledged doors, hung with three 4-inch wrought butts, and fastened with strong thumb latches.

The doors of quarters adjoining are to be 2-inch four-panel square doors, hung with 4-inch wrought butts, and fastened with a 7-inch two-bolt iron rim lock, with brass furniture.

Art. 191. Provide and fix to all internal door openings (except to large wards and other places where solid door frames are shown or specified) jamb linings and soffits, 1½ inches thick, prepared to suit the several thicknesses of the walls, wrought and double rebated for moulded doors, wrought and single rebated

for square doors, ploughed, tongued, and grooved, and grooved and tongued at all angles, and beaded on edges or moulded wherever shown in detail.

Art. 192. Provide and fix 1-inch yellow deal framed grounds round jambs on each side, wrought, beaded on one edge, and splayed for plaster.

The framed grounds apply to all moulded doors throughout the buildings, except where shown otherwise in detail. To be 4 inches wide, and to have an ogee moulding as architrave 2¼" × 1½". All doors specified as square doors are to have a deal fillet, 1½ inches wide, and chamfered to stop plastering, except where detailed.

Art. 193. Provide and fix to all the five windows in board-room 1½-inch splayed and panelled jamb linings and soffits, bent circular, with 1½-inch panelled window backs and elbows, and beaded capping on same, all moulded, as shown on Drawing No. 56, 1-inch framed grounds 4 inches wide, splayed for plaster, architraves 7 inches girt, and square skirting to correspond with the skirting round the room.

Art. 194. Provide and fix to all windows in centre building on first floor, and to all windows in Chaplain's and Purveyor's quarters, 1-inch jamb linings and soffits, tongued and staff beaded, with inch-framed grounds, 4 inches wide, and with ogee moulding, 2½ inches by 1 inch, 1¼-inch tongued and rounded window-boards, with moulding under as shown, and splayed grounds for plaster.

Provide and fix to all windows in non-commissioned officers' quarters similar jamb linings and soffits, splayed wherever shown, with similar rounded window-boards.

All other window jambs and soffits not included in the above (except to wards and rooms of ground floor of centre building) are to be of cement, staff beaded, and to have 1¼-inch tongued and rounded window-boards as before.

Art. 195. The windows of all dwelling-rooms on ground floor of centre building are to have 1½-inch two-panel front shutters, moulded and bead-butt, as shown on Drawing No. 40, 1¼-inch back flaps, bead-butt and square, hung with 1½ pr. of 3-inch wrought butts to each shutter, and 2½-inch back flap hinges. The shutters are to have brass latches and knobs, and 24-inch spring shutter bar fastenings, 1¼-inch bead-butt back linings, tongued to frame, 1¼-inch panelled window backs and elbows, with beaded capping on same, 1½-inch moulded panelled soffits, 1¼-inch boxing grounds, and architrave moulding, 7 inches girt.

Art. 196. Provide and hang 2-inch ledged flap of English oak to outside well to beer cellar, wrought both sides, ploughed and tongued, and put together with white lead, hung folding with iron hook and strap hinges, the hooks being let into stone and run with lead; hinges of wrought iron, the strap 2 feet long, 2 inches wide, ½ an inch thick at eye, and diminished to ⅜ inch at end, levelled on edges, and fixed to flap and ledges with four ¾-inch square wrought-iron screw bolts and nuts, with a Memel fir bearer under flaps 5" × 4" let into stone curb at each side, and secured on top side with wrought-iron hasps and staple, rivetted on a plate, with four screw holes in each plate, and fixed with 1-inch screws; and supply large padlock, thick warded, with bow and key fitted and stamped.

Art. 197. Provide and fix where shown on Basement Plan, a dust flap, 3 feet by 3 feet, hung folding, 2-inch deal wrought both sides, edges shot, ploughed, tongued, and beaded, with strong ledges chamfered, hung with iron hook and strap hinges, 15 inches long, 2 inches wide, ⅜-inch thick, diminishing at ends, and fixed with screws as above. To have hasp, staple, and padlock as above.

Art. 198. Provide and fix in beer cellar wrought deal cask stands, of the lengths shown on plan, legs 6" × 6", sides 6" × 6", dish to bulge of cask, cross-bearers and legs, spaced at every 6 feet, morticed, tenoned and pinned, and to have ¾-inch round iron tie rod under each cross-bearer, with nuts and screws.

Art. 199. Provide open wrought and chamfered deal grating, 2 feet wide, 1½ inch thick, in five widths of the dimensions shown on Plan of Orderlies' Lavatory, screwed to 3" × 1½" deal wrought cross-bearers, one foot apart; also a similar grating to each bath-room throughout the building, and of the figured dimensions. Provide and fix in vapour bath a fir wrought and rounded grating, as shown on detail plan, on proper bearers, made in three widths, so as to be capable of being removed.

Art. 200. All the baths, except for orderlies and nurses, to have 2-inch wainscot wrought capping, rounded on edge as

Framed grounds and door architraves.

Panelled jamb linings.

Window jamb linings.

Boxing shutters.

Flap to beer cellar.

Flap for dust.

Cask stands.

Gratings.

Bath fittings.

Chapel and library doors.

Doors to offices, front building.

Doors to orderlies' rooms and water-closets.

External doors in gateway.

Doors to foul linen closets.

Water-closet doors.

Wash-house doors.

Jamb linings.

shown, and grooved to fit over baths and slate fronts. The capping to have proper bearers. The orderlies' and nurses' baths to have $\frac{3}{4}$ -inch deal matched and beaded casing to fronts, and ends fixed to proper bearers, and to have 2-inch deal wrought capping, rounded on edge, and grooved to fit over bath and casings. Each bath is to have a $1\frac{1}{2}$ -inch deal seat, 18 inches wide, with $\frac{1}{2}$ -inch framed back, as shown on Drawing No. 78, and moveable trellis foot-boards, 18-inches by 24 inches, as before described.

Art. 201. Provide and fix in the position shown on plan of chapel, a pulpit and lectern, or reading desk of deal, in accordance with Detail Drawing No.

Art. 202. Provide and fix to floor of chapel as shown, seats in accordance with Drawing No. 75, 2-inch diminishing wrought deal seats, with rounded edges and ends, and wrought deal chamfered backs. The standards throughout are to be of cast-iron, with flanged ends and sockets, and secured to the floor with stout screws.

Art. 203. The Contractor is to provide a table and two chairs for the altar of chapel, as will be directed. For this service a sum of £20 (twenty pounds) is to be included.

Art. 204. Provide for garden No. 10 garden seats, 10 feet long, with cast-iron bench ends and intermediate standards, similar to those described for chapel, with $1\frac{1}{2}$ wrought deal chamfered open seats, 14 inches wide, rounded front edge, $1\frac{1}{2}$ -inch deal wrought and chamfered sloping backs as for chapel, and 2-inch deal open foot-boards, 10 inches wide, on proper bearers. These seats are to be secured by short bolts to 4-inch tooled York sills, bedded in the ground.

Art. 205. Provide and fix in waiting-room four benches, 10 feet long, similar in every respect to those described for chapel.

Art. 206. The staircase to chapel gallery to be of deal, with well-hole as shown, and with curtailed end to bottom step, $1\frac{1}{4}$ -inch wall strings, ramped and mitred as may be directed, with $\frac{3}{4}$ -inch torus moulding upon same, $1\frac{1}{2}$ -inch cut, mitred, and staff beaded strings wreathed round well-hole, $1\frac{1}{4}$ -inch tread with rounded nosings returned upon strings, inch risers well glued and blocked together, as also the strings, and connected with the step beneath by two $2\frac{1}{4}$ -inch screws; strong fir carriages and bracketings, $1\frac{1}{4}$ -inch landings and bearers where necessary, and $\frac{3}{4}$ -inch staff-beaded apron linings. Oak rounded hand-rail out of $3\frac{3}{4}$ " by $2\frac{1}{2}$ ", with ramps and wreaths as required, and scroll at bottom step; $\frac{3}{4}$ -inch square bar balusters, one to each step, and a plain cast iron newel with bolt hole, and screwed to steps with 2-inch screws.

The steps to non-commissioned officers' quarters are to have $1\frac{1}{2}$ " deal treads with rounded nosings, $1\frac{1}{4}$ " risers, glued and blocked with strong fir carriages and bracketings, and $1\frac{1}{2}$ -inch torus wall strings, ramped and mitred as may be directed, and of the same width as the deal skirting to adjoining rooms.

Art. 207. The gallery of the chapel is to be constructed as shown on Drawing No. 33. The transverse girders, $9'' \times 6''$, are to be in one length, plugged into stone corbel as shown, and framed to receive the longitudinal bearers, which are to be bolted and tenoned into it with bolts. Bearing joists $10'' \times 4''$.

The flooring to be 2-inch in batten widths, wrought on both sides, grooved and iron-tongued, with under edges chamfered as shown, the upper edges of all steps to be rounded.

The under edges of all bearers, girders, and joists to be either beaded or stop-chamfered.

The gallery front to be $2\frac{1}{2}$ inches, framed with circular heads to panels, stop-chamfered, as shown on Drawing No. 59, securely fixed with four wrought-iron knee straps, 3 feet girt, of $1\frac{1}{4}'' \times \frac{1}{4}''$ iron, and screwed with eight 2-inch screws, counter-sunk and let into floor and framing.

Art. 208. The gallery of operating theatre is to have five framed trusses, as shown on the section, braced together with cross ties $4'' \times 4''$, having $3'' \times 4''$ carriages for platforms, strongly bolted together, with all necessary struts and blockings. The flooring is to be $1\frac{3}{4}$ -inch deal grooved and tongued with hoop iron, having rounded nosings, with moulded blocks under; the risers are to be 1-inch matched and beaded deal. Provide and fix steps in centre, and staircase at the back as shown, with $1\frac{1}{4}$ -inch treads and 1-inch risers, with curtain step on proper fir carriages.

The back is to be case'd with $\frac{3}{4}$ matched and beaded boarding, and the front is to have $1\frac{1}{4}$ -inch framed and moulded spandrils, as shown on Drawing No. 60.

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Art. 209. The water-closets are to have fittings as follows:— Those attached to all wards and for medical officers are to be of wainscot; the nurses' and orderlies' closets to be of deal, inch fronts clamped, and made to slide in grooved uprights, screwed to strong framed bearers tenoned into floor and paving; inch tongued seats, rounded on front edge, tongued to risers and screwed to bearers. The flaps and frames to be $1\frac{1}{4}$ -inch, with rounded nosings and hollow mouldings tongued on; frames beaded and flaps clamped with mortice clamps, mitred at each angle, and hung with 3-inch strong brass butts. Fix round seats $\frac{1}{2}$ -inch beaded skirtings, 5 inches wide, tongued at angles with returned beaded ends, and fixed to slate and iron with 2-inch solid-headed brass screws in sockets. The frames of the seats, flaps, and all the fittings connected therewith are to be made removable, and with such concealed mode of fixing as may be approved. Cut holes in seats, with edges rounded, and for handles with beads mitred round.

Art. 210. Prepare and fix (to proper grounds) $1\frac{1}{4}$ -inch framed casings to all pipes, in two panels, the whole height of story, $8\frac{1}{4}$ inches wide and hung with three $2\frac{1}{2}$ -inch brass butts, and each to have small brass latches and keys.

Art. 211. Fix to all water-closets a deal painted paper-box, and in such position as may be pointed out.

Art. 212. The sides and soffits of all cisterns exposed to view are to be lined with $\frac{3}{4}$ -inch wrought deal, grooved, tongued, and beaded, and staff-beaded at angles, with proper backings for securing the same to cisterns, one panel in side lining is to be of perforated zinc and the panel in soffit under unions to pipes is to be made moveable.

Art. 213. Provide and fix to all the ward staircases 2-inch oak treads, wrought both sides, rebated and moulded, with ends returned as shown, and all joints to be double-tongued.

Art. 214. Provide and fix 3-inch perforated oak quadrants to the walls of large wards, to prevent the beds from coming in contact with the walls, securely screwed to the floor, as per detail.

Two-inch quadrant deal skirting round all rooms in wash-house that have limewhited walls and wood floors.

FITTINGS.

Art. 215. Provide and fix in the stores, as shown on Plans, racks for bedding, and patients' packs; the framework to be of Memel fir, wrought and framed in the manner shown on Drawing No. 90, and of the dimensions marked thereon.

Provide and fix shelves in bedding store where shown in accordance with the detail. The wall at back to be lined with $\frac{3}{4}$ -inch matched and beaded deal, and the shelves to be fixed on wrought-iron brackets.

Provide and fix drawers and shelves in utensil store in position shown on Plan, and in accordance with the Drawings, and to be made as follows:—The drawers are to have $1\frac{1}{4}$ -inch front, $\frac{3}{4}$ -inch sides, and 1-inch bottoms, with two strong wrought-iron japped handles on plates to each drawer. The table shelf is to be $1\frac{1}{2}$ -inch thick, ploughed and cross-tongued, and the other shelves $1\frac{1}{4}$ -inch thick, grooved into divisions $1\frac{1}{2}$ -inch thick and 2-inch ends. The cornice moulding is to be as shown, and scribed to the ceiling.

Art. 216. Provide and fix two dwarf dressers in hospital kitchen, and two ditto, 10 feet long, in dry store, in accordance with Drawing No. 91. The top to be planed both sides, ploughed and cross-tongued, and securely fixed to the framing with elm buttons, as shown.

The dresser with plate rack over for the hospital kitchen, and the dressers for the five medical officers' kitchens, are to be of the size and dimensions shown on the Drawing, and framed agreeably thereto; to have $1\frac{1}{2}$ -inch ploughed and tongued top, as before described, fitted with drawers and cupboard fronts, to be hung with $2\frac{1}{4}$ -inch wrought butts, and to have best cupboard locks, bright neck bolts, and hard wood knobs.

Art. 217. The division in potatoe store is to be of yellow fir, framed, as shown on detail, with $5\frac{1}{2}'' \times 4''$ rebated and beaded sill, $5\frac{1}{2}'' \times 3\frac{1}{2}''$ rounded, ploughed, tongued, and beaded head-rail, $3'' \times 3''$ braces, and $1\frac{1}{2}$ -inch matched and beaded filling-in.

Art. 218. Provide and fix bins in dry store of yellow fir, in accordance with the Drawing. The front is to be $1\frac{1}{4}$ -inch square panelled framing, bottom of inch deal ploughed and tongued, nailed on bearers, as shown, with $\frac{3}{4}$ -inch matched and beaded back lining, fixed to $1\frac{1}{4}$ -inch grounds, 1-inch divisions, and $1\frac{1}{2}$ -inch framed covers, hung with 14-inch cross-garnet hinges, and fastened with a superior padlock, with hasp and staple

fitted in the neatest manner. Two of the bins to be lined, as shown, with sheet tin, close tacked, and with soldered angles.

Presses.

Art. 219. Provide and fix deal presses in purveyor's and registry rooms, in accordance with the Drawings, fitted with $1\frac{1}{2}$ -inch cupboard leaves in lower part, hung with $2\frac{1}{2}$ brass butts, and fastened with a superior cupboard lock, and hard wood knob to each.

The press in medical officers' room is to have drawers and cupboard in the lower part, as above described.

Desks.

Art. 220. Provide desks with wainscot table tops in each office, $1\frac{1}{4}$ -inch cross-tongued top, with moulded nosing tongued on, covered with leather and buttoned down, the ends to be $1\frac{1}{4}$ -inch bead flush, with rails to front for drawers and proper runners. Put moulded plinth round. The drawers to have $\frac{3}{4}$ -inch bottoms and rims, and $1\frac{1}{2}$ -inch fronts, each to have a brass lock and hard wood knobs. Tops to be French polished.

The desks for the clerks' offices, in accordance with the Drawings, are to be of deal, wainscot top with rounded edges made sloping, but not covered, and to be fitted with moveable brass rails and standards, as detailed.

Dispensary fittings.

Art. 221. Provide and fix deal dresser and shelves in dispensary with doors and drawers in front of lower part as Drawing, $1\frac{1}{2}$ -inch deal top, front framing under drawers and sides, $1\frac{1}{2}$ inch wainscot middle and bottom rail, wrought both sides and beaded, 3 inches wide, framed to beaded rail, under drawers $3'' \times 2''$, and framed to runners, rail under top $2'' \times 2''$, wrought both sides and beaded to uprights between drawers, back rail wrought both sides, framed to runners and nailed to back linings $3'' \times 2''$ under top; oak runners for drawers $3'' \times 3''$, double and single rebated at sides; $\frac{3}{4}$ -inch back lining planed on one side, rebated and nailed to back edge of sides, top, bottom, and uprights; drawer fronts of $1\frac{1}{4}$ -inch deal, wrought both sides, dovetailed to sides and ploughed for bottom and blocked, sides of $\frac{3}{4}$ -inch deal, dovetailed to sides and nailed to bottom; bottom $\frac{3}{4}$ -inch, tongued to sides and nailed to back; to turn and fix a hard wood knob to each drawer, screwed and glued into front; fronts blocked to stand flush with front framing, and to be secured with one 3-inch brass drawer lock to each of the drawers; the doors to be in one panel of $1\frac{1}{4}$ -inch deal, wrought framed bead and flush fronts and square back, hung folding, and secured with a brass flush bolt at top and bottom, and to have a turned hard wood knob to each, similar to the drawers; panels $1\frac{1}{2}$ -inch thick, to be hung with $2\frac{1}{2}$ -inch brass butt hinges, and each secured with a 4-inch brass cupboard lock, with fine wards and iron plate $\frac{1}{2}$ -inch thick, let in flush and serewed with two serews on stile of door to receive bolt of locks; $1\frac{1}{4}$ -inch deal sides and divisions for upper part of shelves, 10 inches wide and wrought both sides, let into top, grooved, framed to shelves, and sides rebated for back; 1-inch deal shelves, wrought both sides, framed to sides and uprights, with $\frac{3}{4}$ -inch deal front to upper shelves, shaped as shown in the Drawings, deal cornice 3 inches thick and $4\frac{1}{2}$ inches girth, mitred at corners; $\frac{3}{4}$ -inch wrought, beaded, and matched deal backs, planed both sides, rebated and nailed to rebate of sides and back edge of top of dresser and divisions.

Shelves.

Art. 222. Provide and fix in each orderlies' room $1\frac{1}{2}$ inch wrought two-sides deal shelving, cross-tongued, with rounded edges and corners, and mitred where necessary, 14 inches wide, averaging 3 feet lineal per man, to be fixed where directed on light iron brackets, and provide strong japanned pegs, two to each man, screwed to wrought and chamfered deal rail, plugged to wall, and fixed where directed.

Also provide and fix 200 feet of $1\frac{1}{4}$ -inch wrought deal shelving on proper fir bearers as may be directed.

Closets in non-commissioned officers' quarters.

Art. 223. Provide and fix in one room of each non-commissioned officer's quarters, and in each single quarter, including those in wash house building, a dwarf closet, 3 feet 6 inches high, to fit recess on each side of chimney breast, $1\frac{1}{4}$ inch deal wrought framed and beaded fronts, with $1\frac{1}{4}$ -inch framed square and flat both sides, one-panel doors, hung folding, with $2\frac{1}{2}$ -inch wrought butts. Tops to be of $1\frac{1}{4}$ -inch deal, wrought both sides, ploughed and tongued, with rounded nosings, $\frac{1}{2}$ -inch deal skirting, 5 inches high. Each closet to have two shelves of $1\frac{1}{4}$ -inch deal, wrought both sides, ploughed and tongued joints, and one shelf of 1-inch deal, wrought one side, supported on wrought and chamfered fillets plugged to wall. Each closet to be provided with a 4-inch brass spring tumbler lock, with bow of key filled in and engraved, a 4-inch plate-necked brass bolt, with brass plates. Fix over each closet two shelves of $1\frac{1}{4}$ -inch

deal, wrought both sides, ploughed and tongued joints, on wrought chamfered fillets plugged to wall. Where the rooms do not admit of a cupboard on each side of the chimney-breast, a dwarf dresser of the above description, 5 feet 6 inches long, is to be fixed where directed.

Rails and cloak-pins.

Art. 224. Provide and fix $1\frac{1}{2}$ -inch wainscot rail, $4\frac{1}{2}$ inches wide, planed one side, beaded both edges and ends returned, fixed 7 feet above floor to wood blocks, fitted with wrought-iron cloak and cap pins, in such rooms as may be directed. The pins to officers' rooms to be brass. The length of rail required will be 100 feet, and the number of japanned pins 60, and brass 40.

Bookcases.

Art. 225. Provide and fix in officers' library, deal bookcases in accordance with the Drawing. The sides are to be $1\frac{1}{4}$ deal, wrought both sides and let into top. Wrought and moulded cornice and plinth with mitred angles as shown, with 3-inch square pilasters and solid moulded trusses. The shelves to be $1\frac{1}{4}$ -inch deal, wrought both sides, fixed and removeable at pleasure by means of brass pins and catches, fastened to stiles, as shown in detail on Drawing No. 94.

The bookshelves for men's library to be of yellow deal, to have $1\frac{1}{2}$ -inch ploughed and tongued top, $1\frac{1}{2}$ -inch shelves, fitted to $1\frac{1}{4}$ -inch divisions and $1\frac{1}{2}$ -inch ends; the bottom is to rest on bearers $4'' \times 2''$, with a $\frac{3}{4}$ -inch chamfered plinth, 5 inches high; the back is to be $\frac{3}{4}$ -inch matched and beaded boarding, nailed to divisions and ends, which are to be rebated to receive the same. 1-inch beaded fascia, 11 inches wide, is to be fixed to cornice, with $2\frac{1}{4}$ -inch deal moulding, 5 inches girth, doubled mitred at ends, as shown on Drawing.

Ladders.

Art. 226. Provide ladders; sides of Norway poles with English oak cleft rounds, 10 inches from centre to centre, every sixth and the two end ones to be of iron, properly secured with nuts; the nuts to be round and sunk flush with the sides.

Length and size of ladders, as follows:

	Bottom.	Top.	Sides at Bottom.	Sides at Top
Two 60 rounds -	18 ins. wide	14 ins. wide	8 x 4	5 x 3
Two 35 " -	14 " "	10 " "	6 x $3\frac{1}{2}$	$3\frac{3}{4}$ x 2
Two 25 " -	13 " "	9 " "	$5\frac{1}{2}$ x 3	$3\frac{1}{2}$ x 2

Art. 227. Fix to such of the windows as may be ordered, best white Holland roller blinds, with lines, racks, &c., complete. The number required is 542.

Window blinds.

Art. 228. Provide an operating table for lecture room, for which include a sum of 12 guineas, P.C., to be manufactured by E. Whibley, 41 Radnor-street, Chelsea.

Operating table.

Art. 230. Wainscot table for board room and officers' library to have $2\frac{1}{2}$ -inch cross tongued top, with moulded nosings tongued on, covered with leather and buttoned down, with turned and moulded legs as shown on Drawing No. 94. Three of these tables will be required. They are to be French polished.

Wainscot table.

Art. 231. Provide in each of the large wards, tables measuring $12' 0'' \times 3' 6''$, with $2''$ deal tops, cross-tongued at joints, on stout legs tapered. Two similar tables to be provided for the day rooms, and two for the hospital library. One ditto 5 feet by 3 feet for bread store, and one ditto 7 feet by 3 feet for dead-house. One ditto, $10' 0'' \times 4' 0''$, with $8''$ drawers on each side, made as described for articles of a similar kind.

Deal tables.

Art. 232. Provide and fix on each side of bread store three tiers of racks, 12 inches wide. To be of open wrought deal lathing, $1\frac{1}{4}'' \times 1\frac{1}{4}''$, six in each width, screwed to stout deal cantilevers plugged to wall.

Bread racks.

Art. 233. Provide and fix in each utensil store in the basement two ranges of wrought-iron bar rail $2'' \times \frac{1}{4}''$, fixed where directed with light wrought-iron brackets built into the wall, and provide No. 180 $2''$ moveable wrought double hooks for ditto. Two rows of similar rail built into wall, $3'' \times \frac{1}{4}''$, with 20 similar hooks provided and fixed in meat store.

Rails and hooks.

Art. 234. Provide and build in where directed No. 10 wrought-iron double cantilevers of approved pattern, weighing 45 lbs. each, in the basements under wards for suspending ladders.

Cantilevers for ladders.

Art. 235. Provide and fix towel rollers of deal, 1 foot 6 inches long, clear of the gudgeons, $2\frac{1}{2}$ inches diameter, with proper brackets fixed in each lavatory in the front building where

Towel rollers.

directed. Those in the ward lavatories to be of ash turned, 18 inches long.

Art. 236. Provide and fix in each ward scullery a hot closet in the position shown, 2' 0" x 1' 6" and 5 feet high, 1 $\frac{1}{4}$ " deal framed square and flat fronts, hung folding in two panels, each with 3" wrought butts, and fitted with three tiers of cast-iron open galvanized shelving $\frac{3}{16}$ "-thick on wrought chamfered fillets. Ogee moulded capping, and $\frac{3}{4}$ " wrought one side deal top. A small closet latch to each.

No. 21 of these closets will be required.

Art. 239. Provide and build in where directed, No. 303 Sherringham's ventilators, bronzed, for ventilation of wards. Also, No. 49 ditto, 13 $\frac{1}{2}$ " x 6", for ventilation of water-closets and lavatories. To be fixed complete with brass screws, and with hooks, lines, &c.

FOUNDER AND SMITH.

Art. 240. All the castings are to be made of strong grey (No. 3) pig iron, cast from second melting, of qualities approved by the Superintending Officers.

All the cast-iron work must be perfectly smooth castings, of the full dimensions shown by the Drawings, correctly placed, and the girders under the main walls to be bedded on layers of 6lb. lead at their respective proper levels.

The remainder of the girders to be bedded on felt.

The Contractor is to provide all patterns necessary, and to make alterations in the same, from time to time, as may be required.

The quality and strength of all castings must, before they are placed in the building, be submitted in the presence of the Superintending Officer, or some person appointed by him, to a proof not exceeding half the breaking weight.

All expense and risk attending such proving shall be borne and paid by the Contractor. All castings found defective from indifferent material or workmanship shall be rejected and replaced.

Art. 241. All cast-iron girders, lintels, &c., are to have one coat of lithic paint before they are fixed in the building, to be applied immediately after they have been accepted.

Art. 242. The whole of the joists and wall plates to ward floors, and such other places, when Fox and Barrett's floors are indicated, will be provided and delivered on the works by Mr. Barrett, York-buildings, Adelphi, and fixed by the Contractor.

Art. 243. The columns, girders, lintels, bearers, &c., to be cast as shown on the several details, proper bearing plates, meeting flanges, shoes, &c., are to be cast on at the required levels and situations, and bolt holes where necessary for the tie-bolts and junctions, and for securing wood fitches, cradling for beams, &c., the holes being thickened around with rims.

Art. 244. The iron columns for covered way and for chapel, with the moulded caps and bases, to be clean and fine castings. The bottoms of columns to be let into stone, and run with lead.

Art. 245. The iron sashes and skylights in stores, chapel, principal staircase, and wherever else shown on drawings, to be finely cast, built into brickwork, with lugs. There will be three sizes of these sashes required. Those for Nos. 1, 2, 3, and 4 Pavilions to be according to Drawing No. 72, measuring 3 feet 4 inches high. Those for Nos. 5 and 6 to be 4 feet 4 inches high; and those for No. 7 to correspond in height with windows in board-room, officers' library, museum, &c.

Art. 246. Fix from the gutters and flats of all buildings stacks of 4-inch cast-iron rain-water pipe, wherever shown on drawings. The weight of piping to be 6 lbs. per foot run, with proper heads, shoes, and bends to each stack, and a cast-iron spherical grating over each.

The stacks upon the north, east, and west fronts of centre building to be cast ornamental, as per Drawing No. 72.

Art. 247. All eaves guttering, wherever shown, to be fixed with strong brackets or clips.

Art. 248. Provide cast-iron standards for seats of chapel, of waiting-room, and for garden, in accordance with Drawing No. 75.

Art. 249. Fix to the staircase of the centre pavilion and the landings thereof ornamental cast-iron balusters, according to Drawing No. 52, top rail of 1 $\frac{1}{4}$ " x $\frac{1}{4}$ " wrought iron, let into

and screwed to the handrail and balusters, rivetted at top and bottom, as shown. The staircases to the other pavilions and to officers' quarters (centre building) are to be provided with balusters, as shown on drawing, with handrails as before described.

Ornamental standards to Communion table, as shown.

Art. 250. Provide and fix cast-iron strings and carriages for ward staircases, properly trussed, with open trellis pattern risers, as shown, cast with all proper holes, collars, and flanges to receive the wrought iron bolts for securely fixing the same, in accordance with Drawing No. 95.

The strings forming carriages of staircases to be trussed with wrought iron in the manner shown, care being taken that the tension rods are properly adjusted.

The outer angle of quarter spaces of each ward staircase to be supported with 2-inch wrought-iron standards or brackets, as shown.

The strings of central staircase to be strengthened with a 2-inch wrought-iron standard, as shown, and the space beneath to the height of railing filled in with 1-inch wrought-iron balusters.

The quarter space of stone staircase, leading to basement of No. 7 Pavilion is likewise to be supported with a cast iron flanged standard, as per detail.

Art. 251. The railing to flat over corridor and to covered way, where shown, is to be cast in panels, leaded into stone curb at bottom, with 1 $\frac{1}{2}$ -inch round wrought-iron top rail.

Art. 252. The standards to boundary wall, to flat over corridor, and the dwarf standards on terrace wall, are to be cast, as shown, perforated for top and bottom rails, which are to be let in and run with lead, and let into stone curb or coping, and run with lead.

The standards to water-closet partitions with hinges cast on, and with solid ends, as shown. These standards are to be galvanized.

Art. 253. Provide and bed on brickwork of fence walls, north and east sides, also on the entire length of terrace wall, cast-iron coping with socket-joints, and of the form, thickness, and lengths figured on the Drawings.

Art. 254. Supply and fix cast-iron chimney pieces of the patterns shown on Drawing No. 76, and made to fit the several openings figured on the Drawings. The parts to be cast with flanges, with holes for fixing, with nuts and screws to ends of wrought-iron cramps, built into and turned down in the brickwork.

The number of these chimney pieces required is four.

Art. 254A. The ward stoves, consisting of bases and external casings of cast-iron, enclosing fire clay lumps, will be provided to the Contractor, but the flues, consisting partially of cast and partially of wrought iron, and connecting the stoves with the flues in walls, are to be provided by the Contractor in strict conformity with the Drawings furnished.

Great care must be taken that the castings are perfectly sound and true, and likewise that the junctions with base plate and smoke flue are absolutely tight. The cast-iron flue under base plate, and also the abutting and intermediate wrought iron length, are both to be cased with thin sheet iron No. 22, B.W. gauge, as shown, and the space around the former $\frac{7}{8}$ of an inch, run with a mixture of fire clay and lime.

The trapezium shaped space under hearth is to be similarly protected with sheet iron, No. 14, B.W. gauge, and spaced filled with fire clay lute; the space round moveable wrought-iron flue to be left unfilled. The junction between the various lengths of flue is effected by iron clamp bands, hinged below, and fastening with a screw above.

Great care must be taken that these fit accurately, and that they correspond in every part with the Detail Drawings furnished.

The stoves are to face one another in the wards, as shown on plan. The castings for these will be supplied by Messrs. Kennard, and the fire lumps by Mr. George Jennings.

Art. 255. Properly fix all the ventilating grates and ranges, with mantel shelves and fenders complete, in orderlies' rooms and non-commissioned officers' quarters, with all necessary cramps. These articles, manufactured by Messrs. Kennard, will be supplied and delivered by the War Department. Provide and fix in officers' library and museum two 18-inch Nettleton's ventilating stoves, and one 14-inch do. in bed-making room.

Register stoves.	Art. 256. Provide register stoves adapted to the several openings as detailed for the four small rooms in front building.	
Ranges.	Art. 257. Provide and fix No. 27 self-acting ranges, with ovens and back-boilers and fittings, all to be of approved pattern, with brass boiler-taps and screw ferrules, and adapted to the several openings. Also provide and fix in the hospital kitchen, where directed, a large roasting range, W. D. pattern.	
Soot-doors.	Art. 258. Provide and fix in the walls, where required, for sweeping ward flues, soot-doors, according to pattern to be seen at the War Office, with hinges, fastenings, and frames, and finely-ground joints. The number of these soot-doors required is 89. Fix round doors, properly bedded in putty and plaster, Hartley's patent rolled plate glass $\frac{1}{2}$ -inch thick, as per sketch, for the purpose of protecting the brickwork in the immediate vicinity from being discoloured by the soot. The top edge to be protected with a copper caving let into brickwork.	
Spiral staircases.	Art. 259. Provide and fix in bath house and pharmacy circular staircases as shown, with open trellis pattern treads and risers and centre newel. Each tread and riser, with the outer string, is to be in one casting, the inner angle forming a cylinder through which the wrought-iron newel is to pass, and the outer angles to be cast with bolt-holes, collars, &c., to receive the wrought-iron bolts which will connect each step with those adjoining. For these staircases include the sum of £50.	
Shoe scrapers.	Art. 260. Provide No. 50 cast-iron shoe scrapers according to detail.	
Pavement lights.	Art. 261. Provide and fix Barlow's floor lights, 21-inch diameter, as shown, to the coal and wine cellars.	
Urinals.	Art. 262. All the urine basins to be white enamelled ware, Jennings' Patent, and in every respect similar to pattern to be seen at the War Office, Pall Mall, and fitted with self-acting treadle apparatus.	
Doors shoes.	Art. 263. Provide for all external door-frames cast-iron shoes, as per pattern to be furnished.	
Baths.	Art. 264. Provide and fix in orderlies' and nurses' bath-rooms, No. 5 cast iron baths, 6' 6" x 2' 3" x 2' 3", of the form shown on the Drawing.	
Capping.	Art. 265. Provide and fix cast-iron capping and sockets to all slate partitions, wherever shown, the ends to be let into the wall and properly wedged. The whole of this work is to be galvanized.	
Bearers.	Art. 266. Cast-iron bearers of the profile shown on Drawing No. 69, to be provided for carrying the flagging in the corridor of front building, to be caulked into stone templates at each end, and run with lead.	
Heads and shoes.	Art. 267. Provide and fix, with all necessary bolts, screw-bolts, nuts, washers, &c., all requisite heads, shoes for binders, heads and feet of rafters, tie-beams, partitions, &c., as may be ordered, or wherever detailed on the Drawings.	
Skirtings.	Art. 268. Provide and fix, with $1\frac{1}{4}$ -inch stout countersunk screws, round all the orderlies' rooms on the second floor of front building, skirtings, as per regulation pattern, weighing 2 lbs. 10 oz. per foot lineal.	
Gates.	Art. 269. Provide and fix in entrance gateway, one pair of ornamental gates, in accordance with the Drawing No. 74, fitted and framed as shown, with gun-metal pivots and sockets at bottom, and gun-metal rollers and bearers at top, let into bottom rail. With lock and all necessary bolt fastenings of approved design, and with rising and falling gate-stop properly fixed. Similar ornamental gates, as detailed, to be provided for the foot entrances, fitted and framed with gun-metal bearings at top, and gun-metal pivots and sockets at bottom, each to have a 2-bolt spring lock and box staple. Art. 269A. Provide and fix, where shown on basement plan, dust shoots of similar construction to those specified in Art. 258 for soot, and in accordance with detail drawings; also provide for dust shafts, on ground and first floors, doors of approved construction. See Detail Drawing. Art. 269B. Provide and fix in nurses' dormitories in line of framed partitions, two cast-iron stanchions under girders, as per detail. Also provide and fix No. 8 cast-iron columns 6 inches diameter under girders, in orderlies' dining room and clean linen store.	
WROUGHT IRON.		
	Art. 270. Provide and fix over front of drying closet in wash-house a wrought-iron girder, in accordance with Drawing No. 108, the ends to be bedded on stone templates, with 5 lb. lead.	Wrought-iron girder.
	Art. 271. Provide and fix over wash-house the wrought-iron roof in accordance with Drawing No. 112. Each rafter to be in one length, and the curved ribs in two lengths, jointed and coupled as shown. All drills to be carefully executed, and all bolts, nuts, and screws provided which may be requisite for fitting and fixing the roof in the most complete manner. The feet of rafters to be properly secured to stone templates, and bolted with inch rod bolts, as shown. The butting ends of rafters are to have a vertical joint, truly fitted and bolted with wrought screw bolts and nuts.	Roofing.
	Art. 272. Provide and fix to all chimney openings wrought-iron chimney bars, cambering 3 inches, with 9 inches bearing on each jamb, and caulking let into brickwork at each end of bar. Size of bar throughout 3" by $\frac{1}{2}$ ".	Chimney bars.
	Art. 273. Put to each of the king or queen posts to all trusses a stirrup turned up in one piece, 2" by $\frac{3}{8}$ ", with bolts and key wedges complete.	Stirrup irons.
	Art. 274. Put to the feet of the principals throughout, wrought-iron straps, 2" x $\frac{3}{8}$ ", holed for bolts, $\frac{3}{4}$ -inch round screw bolts, with nuts and washers complete.	Straps, &c.
	Art. 275. Supply all ridge irons that may be necessary for the carpenter's use in fixing ridge rolls.	Ridge irons.
	Art. 276. Provide straps, bolts, and ties for the framed partitions in the front building, in accordance with Drawing No. 35.	Straps, &c.
	Art. 277. The chapel and wash-house roofs to be formed with wrought-iron T principals, curved $\frac{7}{8}$ " ribs, flat iron struts and connections, cast-iron shoes and sockets, with screw bolts and nuts, and rivets, as detailed on Drawings Nos. 33, 112, and 113.	Chapel and wash house roofs.
	Art. 278. The roof over entrance to officers' library in basement is to be constructed, as shown on Drawing No. 71, with T iron principals, tension rods, rolled purlins, wrought-iron connecting pieces, cast-iron guttering and shoes, with all necessary screw-bolts, nuts, washers, rivets, &c. The joints of guttering to be secured with oil cement, and laid to a proper fall.	Roofing of covered-way.
	Art. 279. Fix to the orderlies' stairs, nurses' stairs, stairs from officers' quarters to basement, as well as the stairs to chaplain's quarters, boiler room, and central staircase to kitchen, 1-inch round wrought-iron balusters, two to each step, with wrought-iron newels, 2 inches diameter, and wrought-iron hand-rail, $1\frac{1}{2}$ " by $\frac{3}{4}$ ", and rounded on top. The balusters to be rivetted at top into rail, and let in at bottom into stone steps, and run with lead.	Wrought-iron balusters.
	Art. 280. The caves guttering along two sides of all the pavilions, with the exception of the chapel and ends of wards, to be No. 10 gauge, in 6 feet lengths, fixed with 2-inch galvanized screws, 12 inches apart, as shown on Drawing No. 51, and the joints secured with iron cement, and clips of the same gauge, 2 inches wide.	Rolled caves gutter.
	Art. 281. Provide and fix in all wards and in all chimney breasts where ventilating gratings are used, louvred ventilators, with moveable fronts, screwed on in accordance with the detail.	Louvred ventilators.
	Art. 282. Provide No. 24 strong wrought brackets as per detail, for supporting enamelled sinks in ward sculleries.	Brackets for scullery sinks.
	Art. 283. The gates to east entrance, also the gate at S. E. angle of site, are to be of wrought-iron, put together and fixed, as shown on Drawings, with locks and stout fastenings.	Entrance gates in boundary fence.
	Art. 284. Provide and fix wrought-iron guard bars in windows of the chapel, as shown on the Drawings, also to three front windows of linen store in front building.	Guard bars.
	Art. 285. The whole of the railing, with the exception of the standards on the north and east boundary, is to be of wrought iron of the figured dimensions, put together as shown. The standards are to be let into the iron coping, and screwed with nuts underneath.	Fence railing.
	Art. 286. Provide and fix, where directed, a safe of approved pattern, 6L P.C.	Safe.

PLASTERER.

Lath, plaster, etc. Art. 287. Lath, plaster, float, set, and whiten two coats, the ceilings and quarter partitions of the whole of the rooms, staircases, passages, corridors, &c. The lathing to be lath and a half heart of fir laths, free from sap. The laths not to overlap at ends, but to abut against each other, to be nailed separately, and to break joint every 3 feet.

Walls and ceilings of ward, etc. Art. 288. The walls, jambs, and soffits, except itch and lunatic wards, operating and offensive wards, to be covered with two coats of Parian cement. The first coat is to be floated half an inch thick, with equal parts of cleaned washed sharp sand, and the surface dragged while soft, but not made too rough; on the next day a setting coat of pure Parian cement, $\frac{3}{16}$ ths of an inch thick, is to be laid on, and floated with a beech float and finished surface, equal to sample to be seen at the War Office, Pall Mall.

The walls of operating and offensive wards, ward waterclosets and lavatories, and passages leading thereto, are to be covered with Parian cement, in a similar manner, but with a trowelled surface only.

Walls generally. Art. 289. The remainder of all walls of rooms, including day-room, itch ward, lunatic wards, staircases, passages, corridors, &c., to be rendered, floated, and set. Those in the hospital buildings are to be prepared for distemping; also all walls of passages and staircases in front building, except upper floor.

The dwelling rooms in front building to be prepared for papering. The walls of orderlies' rooms and passages in front building to be twice limewashed. When thoroughly dry, the walls of all passages and rooms, not specified to be papered, to be carefully distemped with a light fawn colour.

Ward ceilings. Art. 290. The ceilings of all wards, &c., to be lathed and plastered as before described, the covings in the large ward on the ground floor to be neatly executed of the profile shown, and the external angles over windows to be formed with a bold sweep, as indicated on the Detail Drawing.

The ceilings of all wards to be first rendered in Portland cement, and finished with a coat of putty and superfine plaster of the best description. As these ceilings are of considerable dimensions, great care must be taken to use the material in such a way as to prevent cracking from contraction, and to ensure a uniform and perfect surface.

Skirtings. Art. 291. The skirtings generally throughout the buildings, where not otherwise described, are to be in Parian cement, 12 inches high, and finished with a large flush bead.

The skirtings to corridors on ground and basement floors to be in Parian cement, 12 inches high, and finished with a flush bead.

The pier bases of the seven hospital staircases to be moulded in cement of the profiles shown.

tores. Art. 292. The ceilings of pack store, bedding, and utensil stores, are to be rendered and set, and twice whitened. The walls to be twice limewhitened on brick.

aps, strings, etc. Art. 293. The moulded caps, pilasters, neckings, strings, cornice to chapel, architraves, archivolt, beadings, fascias, bands, &c., wherever shown, are to be executed in Parian cement.

ornices. Art. 294. The several officers' sitting rooms in centre building to have plaster cornices of the girt shown on Detail No. 69. The passages on ground and first floor to have wood cornices, as shown. The staircases and lobbies and bed-rooms to have plaster cornices, as shown. The library, officers' library, museum, and board-room to have cornices, as shown on Drawing No. 69.

enrichments. Art. 295. The several enrichments to staircases, chapel, and board-room, including all centre flowers, consoles, bands, &c., are to be executed in plaster, and twice whitened. All centre flowers to have a rim round.

ngle and flush ads. Art. 296. Run angle and flush beads to all external angles wherever necessary. Open archways to have bold staff-beaded Parian angles, except where shown otherwise in detail.

nder in ce-ent. Art. 297. Render in cement at the back of all external balusters, wherever shown, also the chimney shaft from boiler-house, dust-pits, as well as all warming and ventilating flues, where terra-cotta pipes are not used. Render in cement and sand, in the proportion of two cement to one sand, the walls of rain-water tank, as shown in Detail No. 88, up to the springing line of arches, likewise over arches and the external face below ground line of such walls as form sides of cellars, &c.

Art 298. To execute all requisite beads, quirks, and arrises, Sundries. to plaster all the internal reveals in the material described for the several portions of the building, to perform all dubbing out, to find all needful additional projections and thicknesses, and to counter-lath the work all over any large timbers, and wherever else requisite.

All the mouldings are to be run with copper moulds.

Art. 299. To provide all moulds, which are to be of the best Moulds. description, and prepared according to the Drawings herewith furnished or hereafter to be given, and to execute all such modelling as may be necessary for the completion of the several works, as shown on the Drawings or described in the Specification, and to submit all ornamental casts and enrichments for the approval of the Superintending Officer, and to omit no materials nor workmanship which are either necessarily connected with or implied in the proper completion of all the works.

Art. 300. Flat point and limewhite two coats the walls of Flat point and orderlies' dining-room, corridors, water-closets on basement, lime-white. orderlies' staircase, all rooms on second floor of front building (except non-commissioned officers' quarters), boiler-room, stairs to boiler-room, lifts, cellars, foul linen chambers, dead-house, as well as all basements under large wards, which are not appropriated for stores or other purposes. Also, wash-house, receiving-room, and laundry, &c., boiler-room and engine-room attached.

Art. 301. Line the walls of two of the provision stores with Porecelain tiles. white porcelain tiles, 9 inches square, laid in cement

Art. 302. The whole of the floors of orderlies' rooms in front Pugging. building are to be pugged with coarse lime and hair, laid on $\frac{1}{2}$ " rough boarding on deal fillets.

PLUMBER.

Art. 303. The lead and every other material to be of the best Lead. quality, and of the best and strongest construction; the sheets of even substance; the cast lead to have the selved edges cut off before laid, all joints strongly soldered, and the lead to be perfectly free from sand cracks; the pipes to be properly fixed with sufficient wall-hooks, and not to weigh less than as follows to the foot run without joints:— $\frac{3}{4}$ -inch bore 2 $\frac{1}{2}$ lbs.; 1-inch bore 3 $\frac{3}{4}$ lbs.; 1 $\frac{1}{4}$ -inch bore 5 lbs.; 1 $\frac{1}{2}$ -inch bore 7 lbs.; 2 inch bore 9 $\frac{1}{2}$ lbs.; 3-inch bore 14 lbs.

Art. 304. Lay the gutters, chimney gutters, and valleys of Gutters and roofs to all buildings throughout with the best milled lead, 6 lbs. valleys. to the superficial foot, the valleys to be 24 inches wide, turning up under the slates at least 10 inches, and properly dressed, the lead to lap where required 5 inches, and turned up 6 inches against all brick or stone work and other perpendicular sides, dressed round all angles and to all drips; all gutters not to have less than 2 inches fall in 10 feet.

The gutter in the stone cornice of front building is to have the joints lapped 1 inch and soldered. The joints to be about 5 feet apart.

Art. 305. The flashings to be milled lead, 5 lbs. to the foot Flashings. superficial; stepped flashings 12 inches wide, and horizontal ditto 6 inches wide to be provided and fixed to all parts of the roofs, flats, &c., where necessary; to all gutters, chimney shafts, ventilating turrets, against all walls where roofs abut, and all other parts requiring them, to be let 2 inches into brickwork and stonework, pointed with cement, and firmly secured with T dog-nails, &c., all jointings of flashings are to overlap at the least 3 inches, and turn over upon the lead 4 inches, and upon the slate 7 inches.

Put 5 lb. lead flashing wherever the corridor flat intersects the pavilions, and in those places where the covered way abuts against the buildings.

Art. 306. Cover all hips and ridges with 7 lb. milled lead Hips and ridges. 21 inches wide, properly fixed with lead tacks; all passings in this part of the work to be not less than 6 inches.

Art. 307. All flats with their gutters and cess-pools are to be Flats. laid with 7 lb. lead to the foot superficial, properly dressed over rolls and drips, and to cess-pools, to turn up against all walls, parapets, &c. 6 inches at least, and extend beyond all joints 2 inches.

Art. 308. The cess-pools throughout are to be large, and Cess-pools. lined with 7 lb. lead, strongly soldered at the angles, and to have all requisite solder joints and pipe connections out of 8 lb. milled lead, properly dished and soldered to the bottoms of cess-pools,

and to have proper elbow joints. All cess-pools to be covered over with waggon-head copper gratings, 16 ozs. to the foot superficial.

Sink traps.

Art. 309. Solder into each sink throughout the building a galvanized iron sink trap (Tye and Andrews' patent), with serewed bottom and outlet, of the several sizes detailed.

A 2-inch waste pipe to be properly attached to same, with brass union collar, and to be carried into the nearest soil pipe.

Water-closets, lavatories, etc.

Art. 310. All the ward water-closets throughout are to be fitted up with Jennings' white earthenware pan closets, in one piece. Each closet to be double-trapped, and to have a 1-inch service from the cistern over. 4-inch lead soil pipe, out of 8 lb. lead, to each pan (well secured by proper lead tacks) in chases in brickwork, to convey the soil into the down pipes, which are to be 4 inches diameter on the first floor, and 6 inches on the ground story.

All soil pipes in hospital buildings are to be carried up 6 inches above the roof, and covered with a zinc cap, as shown in detail.

Joints to soil pipes and waste pipes to be made in the most careful manner.

The cistern throughout to have 1½-inch india-rubber tube, ball cock and ball, a 2-inch trumpet-mouthed standing waste, and 1½-inch lead waste pipe, with small syphon trap at bottom.

Provide for each ward lavatory, in the position shown on Drawing No. 27, a small lead trap, let flush into the floor, with moveable cover screwed on, and a 2-inch lead waste pipe from thence to the drain.

The basins to be of white porcelain, 15 inches diameter, and to be provided with gun-metal plug chain and union, similar to sample to be seen at the War Office, Pall-Mall.

Also sink in marble slabs, dishes for soap as per sketch one between every two basins throughout.

Water-closets, front building.

Art. 311. The officers' water-closets in centre building, the nurses' water-closets, and the range adjoining the bath room, the orderlies' closets, and those attached to washing establishment, are to be fitted up with Jennings' patent earthenware pan closets, with white ware basins. Each closet to be double trapped, and to have 1-inch service from the cistern over, or from the nearest main in those cases where cisterns are not provided. The basins to have a 4-inch lead pipe to convey the soil into down pipes, which are to be 8 lb. lead, 4 inches diameter on the first floor, and 6 inches on the ground floor. High pressure valves to be provided for such closets as may be required.

Urinals.

Art. 312. The urinals throughout are to have a small D trap, with moveable cover screwed on, and 1½-inch lead waste pipe from thence to the nearest soil pipe.

Slops sinks, etc.

Art. 313. Provide and fix in each block of ward water-closets an enamelled slop sink, Jennings' patent, with 1-inch service from the cistern over. No. 24 of these sinks will be required, a pattern of which may be seen at the War Office, Pall Mall.

Also provide and let flush into floor in each ward lavatory, a lead sink, 2' 0" x 1' 6", with two rounded corners, fitted with grating. A 2-inch deal curb, above the floor, lined with 6 lbs. lead and flashing to wall, to be fixed round, as shown in detail.

Baths and fittings.

Art. 314. Provide and fix in Governor's quarters, bath-room, and ward lavatories, No. 31 Rufford and Finch's best white glazed Stourbridge ware baths, 5 feet 3 inches long at top, 2 feet 4 inches wide, and 1 foot 11 inches deep, with all proper holes for service and waste. Also sets of brass bath-cocks of approved pattern, with lever handles and spindles, and engraved brass plate, and make good all connections.

The five cast-iron baths in front building are to be McFarlane's patent complete.

Wash-hand ranges.

Art. 315. Provide and fix to floor of orderlies' lavatory in front building a Jennings' washhand range for sixteen men, with brass water-supply, and fittings, &c. complete. Also a foot range for four men, with brass cold-water fittings complete, McFarlane's patent.

Shower bath.

Art. 316. Provide and fix complete, in bath-house, a copper shower-bath, 2 feet diameter and 12 inches deep, with perforated chamber underneath, 15 inches diameter and 6 inches deep; to have a lever handle, large brass plug and washer, 6 feet of stout brass chain, and ring pull complete; the steam boiler to be provided by Messrs. Jeakes.

PAINTER AND PAPERHANGER.

All the work to be properly prepared for painting. All wood-work to be twice knotted, the knots covered with silver leaf, and

the work of every description to be carefully stopped and primed down smooth between each coat. All the lead and oils to be of the best quality. The varnish to be the best copal.

Art. 319. Paint four oils, in linseed oil and white lead, all the external and internal wood, iron, cement (except the Parian cement on walls) and other works usually painted, and finish the same in stone colour, or any other approved plain tint as may be directed, as dark oak, purple, brown, red, white, green, fawn, or drab. All external doors are to be finished bronze-green and twice varnished.

Paint four oils.

Art. 320. All internal doors, except one side of chapel doors, and where oak is specified, are to be grained oak and twice varnished. Chapel doors, internally, to be finished in two plain tints, and flatted to correspond with roof stains. Wainscot doors to wards and wainscot sashes or frames to wards, to be twice varnished.

Grain and varnish.

Art. 321. Gallery front to chapel and chapel seating to be finished with a light stain, and to be twice varnished. Roof of chapel and dado to be finished with two stains, and twice varnished; the boarding and deal mouldings to be a very pale tint, the casings to be a shade darker. Twice varnish wainscot hand-rails throughout the buildings.

Stain and varnish.

Art. 322. All iron-work exposed to view, internally and externally, such as iron railings, balusters, panels, columns, girders, &c., to be finished bronze-green, two coats being laid on all iron-work, visible or not, after it has been accepted.

Bronze green.

Art. 323. The external eaves gutters to be painted four coats in oil, stone colour, to correspond with the stone-work of the buildings.

Eaves gutters.

Art. 324. Paint all the iron chimney-pieces, except where Berlin black is used, four coats in oil, as may be directed, the first coat being in red lead.

Chimney-piece

Art. 325. The standards to altar to be four coats and partly gilt.

Altar railing.

Art. 326. Efficient artists to be employed for the above, and for the wainscot work, and everything appertaining to the painting. The tints in all cases to be approved by the Superintending Officer.

Efficient artists

Art. 327. Pumice, size, and prepare such walls as are to be papered. Officers' sitting rooms, as well as all offices in front building, are to have paper, value 2s. 6d. per piece, P.C.; quarters in wash-house 1s. 6d. per piece, P.C.; nurses' rooms and bedrooms in the front building 1s. per piece, P.C. The Contractor is to furnish a variety of patterns of papers for this purpose, of good quality and design, and to submit the same to the Superintending Officer for selection and approval.

Paper hanging

GLAZIER.

The glass to be the best of their respective kinds, free from all defects, to be accurately cut to fit the rebates, carefully bedded, putted and back putted, and bradded, and perform all necessary cuttings.

All fanlights over doors, and all doors shown or specified to have glass panels, are to be fitted with the best polished plate, ¼-inch thick. Glazed panels to be bedded in wash-leather.

Art. 328. Glaze the whole of the windows of the front building, and all windows in hospital buildings, except ward windows, with the best seconds crown glass, in squares under 3 feet superficial. Squares containing from 3 and under 6 feet superficial to be glazed with 16-oz. sheet glass. All larger sizes to be 21-oz. sheet.

Crown glass.

Art. 329. The windows of chapel to be glazed with Hartley's ¼th fine rolled plate glass. The border to be ruby coloured sheet, as shown on Drawing.

Chapel window

Art. 330. The ward windows throughout to be glazed with the best polished plate, ¼-inch thick, fixed with brass counter-sunk screws and collars, as shown on Detail No. 55.

Plate glass.

Art. 331. Glaze with Hartley's patent rough plate glass of thicknesses figured on the drawings, the roof of covered way, windows of wash-house, boiler-room, engine-room, and ventilators in washing establishment, also doors to W. C. lobbies in front building, and all skylights and rooflights throughout.

Rough plate.

Art. 332. Provide six perforated panes to be fixed in windows of passage of basement in front building, as may be directed.

Perforated pane

BELL-HANGER.

Bells.

Art. 333. Provide in front building, as may be directed, No. 4 pulls, with cranks, wires, &c., complete with concealed tubes, and with good toned bell gongs, to ring from one-pair floor to basement.

Also two similar pulls from Governor's quarters to his servant's room.

The several pavilions are to be provided with bell gongs, so arranged, with all necessary handles and pulls, that each attendant, in both upper and lower wards, shall be able to communicate with the bell-room in basement, and learn by a return signal that they have been heard and will be attended to. The bell-room is to be fitted with a bell board, on which sufficient gongs and carriages are to be fixed to enable the bellman readily to ascertain in which pavilion he is required, and on which floor. A detail showing the arrangement proposed will be furnished. All bells, gongs, cranks, &c. to be of the best description, and the wires in exposed situations, as basement

archway, to be cased in woodwork. Pulls to be sliding, direct, well made, and solid.

ZINC-WORKER.

Art. 334. Provide and fix on roof, as terminations to air flues Ventilators, and soil pipes, No. 28 stout zinc ventilators, 6 inches diameter, and with conical zinc caps, in accordance with the Drawing No. 22. Similar ventilators, 8 inches diameter, 18 inches long.

Art. 335. Provide and fix where necessary, with all requisite Tubing, heads, elbows, and connections, sufficient quantity of 6-inch stout zinc tubing, for connecting earthenware soil pipes, &c., with zinc ventilators as above.

Also all necessary tubing, as shown on Drawing, for carrying off the heated air from the drying-room of wash-house, making good with cement the connections to tile arch.

Art. 336. Provide and fill in shutters of meat and dairy store Wire gauze, with wire gauze, as shown on drawing No. 43. The gauze to be valued at 6d. per foot, P.C.

WARMING.

Boilers.

1. Supply and fix, where shown, in the boiler house, two wrought-iron cylindrical boilers, 17 feet long, 4 feet diameter, with flue through the centre, provided with such apparatus as may be required. The furnaces are to be provided with a self-acting apparatus, for the admission of air at the bridge and through the fire door, for the prevention of dense smoke, with all necessary dampers and balance gear, and soot and sweep doors. The boilers are to be connected with 10-inch connecting pieces, fitted with 10-inch seat valves, so as to effectually cut off the connections in case of repairs to either boiler, and so arranged that one or both boilers may be used for the entire work. The connections between the boilers to be fitted with expansion joints. The 10-inch main flow and return pipe to be carried on from the boilers to the pipe chamber in the corridor, and fitted with two 6-inch outlet pieces each. Each outlet piece to be fitted with a 6-inch regulating valve, fitted with spindle brought through floor, and provided with key.

Circulating pipes.

2. Carry on from the 10-inch mains a circulation in 5-inch strong east-iron pipes, the entire length of corridor, within the chamber formed under the basement floor. These pipes to be carried on iron bearers, fitted with rollers, making the roller for each pipe to work separately. Each of the pipes to be fitted with four expansion joints, properly arranged as to distance. The mains to be fitted with T outlet pieces for the various coils, as hereafter described, and all the joints to be made with iron cement and left sound. Each outlet will be fitted with regulating valves for effectually shutting off the same in case of repair.

Air ducts to be formed where shown, to deliver the warm air into the corridor, each to be fitted with a regulating valve fitted to grating at the delivery openings, and provided with iron gratings of an approved pattern for the fresh air ducts.

Boils of pipe.

3. Fix in the eleven ends of pavilions, where shown, coils of 4-inch cast-iron pipes, of sufficient power to warm the lavatories and water-closets. These coils are to be placed vertically, and to be enclosed in a brick chamber, with slate cover over one-half of coil, and are to communicate with the lavatories and water-closets by air-ducts, as shown. Each of these ducts is to have a regulating valve fitted with iron grating of approved pattern, as for corridor. Each coil is to be connected with the main circulating pipe by a 2-inch flow and return pipe, carried on hanging brackets, and fitted with rollers, as before described. Each flow and return pipe to be fitted with an expansion joint, and all necessary connecting pieces to mains.

elt.

4. All the main pipes are to be covered with three thicknesses of stout hair felt, except where protected by brickwork. Each coil to have a separate regulating valve and air pipe, and all the joints to be made perfect in iron cement.

ow and return.

5. Lay on from the boilers to the chapel a 2-inch flow and return pipe, to work from either boiler, with valves, &c., as before described, and fix round walls of chapel two tiers of 4-inch pipe, as shown, with all necessary air pipes, and valves for shutting off, and bends and elbows for carrying the same under all doors and openings.

The hospital library on the ground floor to be warmed by means of a similar 4-inch circulation round the walls, as shown, with provision for regulating the same, as before described, supplied with a 2-inch pipe from the main.

6. Fix in each corridor on ground and first floor, cased as shown on Drawing No. 76, twenty coils, in the position shown on plans. The coils to be 2-inch cast-iron spigot pipes, with syphon connections to the 6-inch mains below the basement, and to have 1½-inch flow and return pipes in patent wrought tubing. Each coil to be fitted with regulating valve and air pipe, and to be cased as shown.

The radiating surface of each coil to be calculated at feet superficial.

7. Fix in each of the six-ward staircases a vertical coil, as shown on Detail Drawing No. 76, with ornamental base and cap. These castings to be clean and sharp, and to be submitted for approval prior to being fixed. Each of these coils to be provided with proper means of regulation, and to be connected with the 6-inch mains, as described for the corridor.

Two similar coils, with all necessary connections, to be provided for central staircase.

8. Supply and fix where directed an air expansion cistern of sufficient size to hold one-tenth of the entire contents of the pipes and boilers, to be fitted with 3-inch washer and waste, and overflow with 3-inch waste carried into drain. Lay on the water to the same from the cold-water service with 1½-inch patent iron pipe and 1½-inch ball-valve. Each boiler is to have a separate supply from cistern, and fitted with 1½-inch stop-cock, to admit of either boiler being worked separately.

Expansion cistern.

9. Supply and fix in basement beneath nurses' dormitories a small apparatus sufficient for warming by circulation the nurses' berths; and lay round walls, as shown, two tiers of 2-inch pipe, with all necessary air pipes and valves for shutting off the same.

Nurses' berths.

9A. Provide and fix in boiler-house a small boiler complete, for supply of steam, &c. to vapour-bath.

Vapour bath.

The pipes in connection with this service to be coloured YELLOW.

HOT-WATER SERVICE.

10. Supply and fix in the boiler-house, where shown, two cylindrical boilers, 17 feet long and 4 feet diameter, with flues through the same. Each of these boilers to be supplied with a set of furnace work with soot doors, dampers, tie-rods, and balance gear for dampers, and all necessary apparatus complete, as before described.

Boilers.

11. Take from the two boilers a circulation in 10-inch main communicating with 6-inch flange-pipe in two parts the entire length of the building. Each boiler is to be connected with two flow and two return pipes, each leading to a 10-inch main, fitted with branch outlets for the 6-inch circulating pipes, and with regulating valves so arranged that either one or both boilers may be used. The pipes are to be carried on rollers fitted into cast-iron frames prepared for fixing on brick foundations, with the necessary holding-down-bolts and nuts, the ends of these pipes to be fitted with syphon-boxes having expansive joints; also, to have eight other expansive joints in the entire length of the 6 inch flow and return pipes. All the joints to be flange joints, and soundly made with mill-board and red cement, with all the necessary bolts and nuts for the same; the mill-board to be soaked in oil before being used.

Circulation.

- Outlets.** 12. Provide in these 6-inch circulating pipes No. 30 $1\frac{1}{2}$ -inch outlets properly prepared for branch circulation.
- Counter circulation.** 13. Lay on from the 6-inch mains a counter-circulation, in $1\frac{1}{2}$ -inch patent wrought tubing, through each of the lavatories at ends of the wards; through lavatories in lunatic wards; through sculleries in iteh and operating wards; to the seven baths in the bath-room on the ground floor; to the five baths and the four basins on the ground, first, and second floors of front building, with counter circulation to the three sinks in the basement and first floor. Proper provision is to be made in these branch circulations for expansion and contraction.
- Fel** 14. The whole of the 6-inch and the $1\frac{1}{2}$ -inch pipes to be covered with three thicknesses of hair felt, each thickness being made secure.
- Brackets.** 15. The $1\frac{1}{2}$ -inch pipes to be carried along the pavilions on hanging brackets, and with proper holding stays for the vertical pipes in chases in the wall.
- Directions for laying on warm water.** 16. Lay on from these circulating mains hot-water to the various places, as follows:—
To the bath in iteh-ward, with 1-inch patent wrought pipe, including all bends and connections, and outlet pieces on main:
To the two basins in iteh-ward; to the sink in dissecting-room; to the seven sinks in non-commissioned officers' quarters; to the sink in dispensary; to the sink in hospital scullery; also, to the sink in front building, and to one draw-off for pails; with $\frac{3}{4}$ -inch patent tubing, and $\frac{3}{4}$ -inch gun-metal bib-valves, including all bends, T pieces, and connections, and with outlet pieces on main:
To the bath in lunatic wards; to the ten baths at ends of wards; and to the seven baths and shower bath in bath-room, with 1-inch patent wrought pipe, including all bends and connections, and out-pieces on main:
To the two basins in lunatic wards; to the thirty-three basins in lavatories at ends of wards; to one basin in operating theatre; to the ten sinks in ward sculleries; to the ten draw-offs in ward lavatories for filling portable baths; to the one sink in operating ward; and to the four basins in lavatories (front building), with $\frac{3}{4}$ -inch patent wrought tubing, and $\frac{3}{4}$ -inch gun-metal bib-cocks, including all bends, connections, &c.:
To the eleven baths at ends of wards, and one bath in front building, as before; to the eleven sinks in ward sculleries; to thirty-three basins at ends of wards; to two sinks and two draw-offs for pails in front building; and to eleven draw-offs in ward lavatories for filling portable baths, as before.
Each of the $1\frac{1}{2}$ -inch circulating mains is to have two $1\frac{1}{2}$ -inch gun-metal stop-cocks, fixed near the junction with the 6-inch main, so arranged that any section may be shut off for repairs or otherwise, without stopping the other parts.
- Counter circulation.** 17. Carry a counter-circulation from the 6-inch main to a coil in $1\frac{1}{2}$ -inch patent wrought tube, to be fixed in each of the ward sculleries (No. 21), each coil to be provided with means of regulation, and fitted with all necessary expansion joints and air pipes.
The pipes in connection with this service to be colored RED.
- Mains.** **COLD-WATER SERVICE.**
18. Lay along the outside of the building, as shown by red lines on the plan of water service, two 4-inch strong cast-iron pipes, with ends fitted with 4-inch valve, prepared for attaching to large main from reservoir. These mains to be provided with 2-inch outlet pieces, for vertical mains, as follows:—
Two for front buildings; eleven for water-closets at ends of wards. Carry up the vertical mains in 2-inch strong cast pipe, in the chases provided, up to the lavatories and water-closets on the first and second floors, with 2-inch outlet pieces for the ground floor service. This main to be provided with a 2-inch valve, for the purpose of shutting off for repairs.
Lay down through the centre of the building, as shown by a red line, a 4-inch main, fitted with a 4-inch valve and prepared for large main, as above. This main is to be provided with 17 2-inch outlets, as follows:—1 for lavatory and water closet in lunatic wards, ground floor; 11 for ward sculleries; 1 for dispensary; 1 for operating ward; 2 for bath-room; and 1 for kitchen.
- Services.** 19. Carry up from these outlets 2-inch cast-iron service pipes to the lavatory in lunatic wards, with proper outlets prepared for connecting the branch services. Similar service pipes to the ward sculleries on ground and first floors, with proper outlets for branch services. Also to operating ward, offensive ward, bath-room, and kitchen. Each of these seventeen mains to be fitted with a 2-inch valve as before, and to be carried up, when necessary, to supply cisterns.
20. Lay on from the nearest cistern to the bath in iteh ward, with 1-inch patent wrought tubing, with all necessary bends, connections, and T pieces:—To the urinal with $\frac{1}{2}$ -inch similar tubing; to the two basins with $\frac{3}{4}$ -inch pipe and $\frac{3}{4}$ -inch bib-valves, including all bends, connections, and T pieces; to the sink with $\frac{3}{4}$ -inch tubing and $\frac{3}{4}$ -inch gun metal bib cock, including all connections and bends; to the dissecting-room sink, and one draw-off for pails, with 1-inch pipe and $\frac{3}{4}$ -inch gun-metal bib-cock; to the sink in basement of front building with $\frac{3}{4}$ -inch tubing and gun-metal bib cock; to the seven sinks in non-commissioned officers' quarters, as shown, with $\frac{3}{4}$ -inch tubing and $\frac{3}{4}$ -inch gun-metal bib-cocks; to the sink in dispensary and in hospital kitchen with 1-inch patent pipe and gun-metal bib-cock; to the urinal in front building with $\frac{1}{2}$ -inch tubing.
To the five sinks in officers' kitchens and to the sink and copper in hospital scullery with 1-inch patent pipe; to the cooking apparatus in hospital kitchen with $1\frac{1}{4}$ -inch pipe, and to the five supply cisterns to ranges in officers' kitchens with $\frac{1}{2}$ -inch tubing, and $\frac{3}{4}$ -inch gun-metal ball valves and balls.
Lay on from the nearest cistern, with $1\frac{1}{4}$ -inch patent wrought tubing, with all necessary bends, connections, and T pieces, to the bath in separate wards; to the ten baths at ends of wards, and two 2-inch pipes for the rising mains to the seven baths in bath-room.
Lay on from the same cisterns, with $\frac{3}{4}$ -inch wrought tubing and $\frac{3}{4}$ -inch bib-valves, including all bends, connections, and T pieces, to the thirty-three basins at ends of wards; to the ten sinks in ward sculleries and operating ward, and to the basin in operating theatre; to the sink in ditto; to the supply cistern of range in orderly medical officer's kitchen; to the sink in ditto; to the four basins in lavatories, front building, and two draw-offs for pails.
Lay on from the same cisterns, with $\frac{3}{4}$ -inch patent wrought tubing, to the ten urinals at ends of wards, and also to the ten bath sinks at ends of wards.
Lay on from the nearest cisterns, with 1-inch patent pipe, with all necessary bends, connections, and T pieces, to the eleven baths at ends of wards; and to one bath for nurses in front building, and to governor's bath.
Lay on from the same cisterns, with $\frac{3}{4}$ -inch wrought tubing, including all necessary bends, connections, and T pieces, and $\frac{1}{2}$ -inch bib-valves, as before; to the thirty-three basins at ends of wards; to the basin in offensive ward; to the eleven sinks in ward sculleries; to the two sinks and two draw-offs for pails in front building, and to the range in nurses' day-room.
Lay on from the same cisterns, with $\frac{3}{4}$ -inch patent wrought tubing, to the eleven urinals at ends of wards and to the eleven bath sinks at ends of wards.
Lay on from nearest cisterns, as before, with 1-inch patent pipe, to the four baths attached to orderlies' quarters. Also, with $\frac{3}{4}$ -inch patent wrought tubing, and $\frac{1}{2}$ -inch bib-cocks, to the sixteen basins in orderlies' lavatory, to the two sinks in non-commissioned officers' quarters, front building, and to the sink and range in kitchen attached to chaplain's quarters. Also, with $\frac{3}{4}$ -inch patent tubing, to the two urinals in front building.
- Note.**—All the mains within the building to be eased in dry-hair felt.
All the cocks to be of gun-metal, full water-way, with lever handles and screwed bottoms.
The pipes in connection with this service to be coloured BLUE.
- FIRE-MAIN SERVICE.**
21. Fix near the end of each ward in ground floor corridor, and in the floor above, a 2-inch fire-cock, fitted with brigade screw and cap for hose, the same to be connected to the 2-inch rising main in ward sculleries, with proper connecting pipes. Each cock to be provided with a lever and cap, with chain and staple for fixing the same. A fire-cock of similar description to be fixed in each lavatory at end of ward, with the necessary connection to the main, with chain and staple as before.
Six fire-cocks in front building connected to the 2-inch mains, with lever, chain, and staple, as above.
Fourteen stand-pipes to be fixed outside the buildings where directed, connected with the 4-inch mains, and prepared for brigade hose.

FITTINGS AND MACHINERY FOR WASH-HOUSE AND LAUNDRY.

- Boiler. 22. Provide and fix in the position shown on Drawing No. 106, one wrought-iron cylindrical boiler, 12 feet long, 3 feet 6 inches diameter, with flue through the same, and provided with approved float and feed-gear, water-gauges, &c., as described for the other boilers.
- Engine. 23. Provide and fix in engine room a vertical steam engine of 4-horse power, with fly-wheel, governor, and expansion gear, connected with steam boiler by 2-inch wrought steam pipe, and so arranged that the waste steam may be blown through the hot water cistern, or through a separate waste steam pipe.
- Shafting. 24. Provide lines of 2½-inch circular wrought shafting, with clutches and connections, on cast brackets, with gun-metal plummer blocks and proper gear for connecting the same with engine in the wash-house and laundry, for driving the two washing machines, the wringing machine, the two box mangles, and the fan of desiccating apparatus. Pulleys for the same are to be not less than 6 inches wide, and of such dimensions that a proper speed may be maintained in the several machines they are employed to drive. Drip-cups, properly hung, to be provided to each of the bearings.
- Washing troughs. 25. Provide and fix, as shown No. 16 washing troughs, formed with 2-inch clean white pine bottoms and 1½-inch backs; fronts and sides as detailed. The troughs to be bolted together with ½-inch copper bolts, one to each division, and screwed with copper screws, and to be supported by cast-iron standard, as shown. These standards are to be provided with a cast-iron waste trough-pipe, connected in the centre with a 4-inch waste pipe, properly trapped, and passing into the drain. Each trough is to be provided with a gun-metal waste plug and chain, as shown. Hot and cold water is to be laid on to each trough by means of ¾-inch gun-metal full-way cocks and levers, connected by T pieces, with 1½-inch iron mains, and steam pipes to each alternate trough.
- All the pipes for supplying troughs are to be eased as shown.

26. Provide and fix three oak steaming tubs, with perforated bottoms, in accordance with the Detail Drawing, with all necessary supply, steam, and waste fittings, with gun-metal cocks and valves. Steaming tubs.

27. Provide and fix over drying-closet, as shown, a galvanized wrought-iron cistern, No. 10 B.W. gauge, of the figured dimensions, with steam-worm, consisting of 150 feet of 1½ galvanized iron pipe, connected with steam-main by a gun-metal cock, and provided with condensed cock and pipe. This cistern is to have a galvanized wrought-iron cover, flanged with bolts and nuts, and connected with a 1½-inch waste steam-pipe, carried where directed. The connection with hot-water supply pipes is to be made with 1½-inch pipe with gun-metal stop-cocks. Cisterns.

28. Provide and fix No. 16 horses 15 inches wide and of the figured heights and lengths. Each horse to have six galvanized iron rails running on turned and bored rollers and wrought guide-rails, front and back plate of wrought iron, the front covered with 1½-inch deal, and an iron japanned handle bolted thereto. Each closet is to be heated by the hot air from the desiccating apparatus, which will be supplied and delivered by the Department, and fixed by the Contractor for this portion of the work as may be directed, with all necessary brickwork, fire-bricks, fire-clay, &c. The back to be afterwards rendered with cement, as shown on Drawing. Drying closet.

29. An ironing stove, with top plate 3 feet by 2 feet 6 inches, to be provided and fixed where directed, and so arranged that the waste heat from the desiccating apparatus can be made available. Ironing stove.

30. Two washing-machines (Williamson's patent), one to have a trough 6 feet long, the other 3 feet 6 inches long, to be provided and fixed in the position shown. Washing machines.

One wringing machine of approved make, and one rinser with strainer attached, to be fixed in the wash-house where directed.

Two patent chain-mangles with mahogany beds and fast and loose pulleys, and with all necessary starting gear, and double straps for driving.

SPECIFICATION for the RESERVOIRS and other WORKS for the WATER SUPPLY of the HERBERT HOSPITAL.

The contract includes the lime water reservoir, service reservoirs, depositing reservoirs, lime house, store room or workshop, whitening pits, road, boundary walls, entrance gates, and other works referred to in this specification and shewn on the Drawings marked Herbert Hospital Water Supply, Drawings Nos. 23, 24, 25, 26, 27, 28, 29, 30, and shall be executed of the size and in accordance with the particulars shewn on such drawings, the figured dimensions wherever given being taken in preference to the scale should any difference exist.

SITE.

The reservoirs, road, boundary walls, &c. are intended to be constructed in a conveniently accessible situation in a certain field on the western side of Shooter's Hill in the county of Kent adjoining an accommodation road leading from the Shooter's Hill turnpike road in a southerly direction towards Severn Droog Castle, and distant about one third of a mile in an easterly direction from the Herbert Hospital.

EXCAVATOR.

The grass sod shall be carefully pared off as thin as possible from the surface of the ground to be excavated or embanked upon, and laid by in a heap to rot.

The soil or black vegetable mould under the grass sod shall be taken off the surface of the ground aforesaid to the depth of 8 inches at least, and be carefully removed and put on one side, to be afterwards used with the rotted grass sod and for re-soiling the top or upper surface of the ground tinted green on plan No. 1.

The gorse or furze, &c. now growing on the ground tinted green as aforesaid shall be carefully taken up, roots and all, and be dried and burned.

The ground shall be excavated to the depths shewn upon the drawings for such parts of the work as are below the surface, and as near to the size of the brickwork and concrete as possible.

Along the outside of the concrete, beneath the service reservoirs, shall be laid two rows of earthenware agricultural drain pipes, side by side, two inches internal diameter, properly laid in straw with a fall nowhere less than 1 inch in 10 feet, one

row commencing with the aforesaid fall from the centre of the east side of the service reservoir to be carried around the half of the east side, the north side, and the half of the west side. The drain pipes shall also be carried with the aforesaid fall along the other half of the east side, the south side, and the other half of the west side, and shall then meet the before-described pipes, and be continued alongside the bottom of the trench excavated for the main drain for such distance as may be ordered, and joining the drain terminating at the culvert under the Eltham road.

The top of the drain pipes shall be covered with clean gravel stones for their own length (the stones being not more than 1½ inches nor less than ¾ inch diameter) for 6 inches in depth. Two perpendicular gravel drains, 12 inches square, composed of stones as before described, shall be carried up from the before-mentioned gravel drains immediately outside and adjoining the brickwork on each of the four sides of the depositing reservoir, distant not more than 24 feet apart to within 3 feet of the intended surface of the ground.

Two rows of similar drain pipes to be laid and covered in a similar manner with stones shall be carried all along the outside and close to the bottom footings of the east boundary wall on its eastern side, having a fall from south to north similar to the footings, the same to be returned round the northern boundary wall, and be let into and made good to the 9-inch stoneware drain near to north-east corner of building.

Similar drain pipes and drains shall be carried along the outside of the footings of the east end of the southern boundary wall in a westerly direction for a distance of 51 feet, when the drains shall terminate in a bed of clean gravel stones or shingle 30 inches diameter, and carried from the drain pipes upwards to the surface of the ground.

Perpendicular gravel drains, 9 inches square, composed of clean gravel or shingle of the size before described, shall be carried up outside the boundary walls from a junction with the before-named gravel drains near the footings to within 3 feet of the surface of the ground, and distant about 20 feet apart, one being placed between every other buttress.

Any vacancies between the outside of the brickwork and the ground as excavated, besides those occupied by the before-mentioned drains, to be gradually filled in, in layers 9 inches in thickness and the material taken out in excavation, each layer being watered and well rammed or punned as the work proceeds.

The surplus earth to be carted away to any distance not exceeding 200 yards, and disposed of as directed.

The slopes and surface of the banks and cuttings both outside and inside the boundary walls to be as shown by the Drawings.

The material forming the embankments to be raised in regular concave layers not more than 9 inches in thickness, each layer to be completed and properly regulated to the full breadth before another layer is commenced. The material to be carefully broken, spread, and rammed or punned so as to leave the embankment solid in every part, and especially against the brickwork.

The accommodation road leading from the existing road to the entrance gates, and the road from the entrance gates along the whole front of the building, to be formed by excavating the ground for the whole width of the road, as shown, for 13 inches in depth below the intended surface, and filling up the first 9 inches of the excavation with broken flint stones not more than 2 inches or less than $1\frac{1}{2}$ inches diameter, and by filling up the remaining 4 inches in depth with binding gravel.

The surface of the ground bounded by the boundary walls to the east of the road before the front of the buildings shall be covered with a layer 3 inches in thickness of broken flint stones, in size not more than $1\frac{1}{2}$ inches diameter; the surface of the stones shall then be covered with a layer 3 inches in thickness of the best binding gravel. The surface to be carefully rolled to an even and true plane, with falls as shown on the Drawings.

The surface of the ground around the buildings tinted green on plan, after being properly trimmed to the form shewn on the Drawings, shall have evenly spread over it the black mould, soil, or vegetable earth taken from beneath the grass sod, together with the sod broken into very small pieces. The ground shall then be very carefully forked up at least 12 inches in depth, and have six loads of well-rotted stable manure dug into it, when the surface shall be raked and rolled, and be sown in a proper manner with fine grass seed of the best description.

BRICKLAYER.

Concrete.

The foundations, bottoms of the reservoirs, roofs, &c. where so shewn on the Drawing, shall be made of concrete composed of and in the proportion of 3 bushels of the best Portland cement to 9 bushels of clean, sharp river sand, and 12 bushels of perfectly clean gravel stones, no stone of which shall be so large as not pass in any direction through a ring $1\frac{1}{2}$ inches diameter. The gravel stones shall be carefully cleaned and washed (if required) so as to leave the stones as clean as the shingle found near the sea on the seashore. The sand shall be clean, sharp river sand of the best description, and none other shall be allowed to be used.

The Portland cement and sand shall be well incorporated and mixed, and formed into a stiff mortar, immediately before it is to be used for making the concrete.

The mortar shall then be put into a pug mill worked by a horse, and therein well and thoroughly mixed with an equal quantity, bulk for bulk, of the gravel before mentioned, until a thorough admixture of all the parts be effected, and the mixture is brought to a tough consistency, when it is to be immediately taken to the place where it is required to be used, and used in such a manner as to require as little levelling as possible.

The concrete forming the foundations, the bottom of the reservoirs, and the roof shall be formed in even layers all over not more than 4 inches thick, each layer being well rammed or punned together, and the top surface shall be brought to a firm level and smooth surface, with the exact falls indicated upon the Drawings.

The concrete forming the roofs and the bottoms of the depositing reservoirs shall be supported while the roofs are being formed, and until the concrete is sufficiently set, with deal boards about 1 inch thick, laid close together with the wrought-iron girders, and properly supported below the upper surface of the boards which the concrete will rest upon, being first washed over with loam and water about the consistency of treacle, and allowed to dry on the boards, in order to prevent the concrete adhering to the boards.

The mortar used in all the walls, &c. of the reservoirs and foundations as high as the top water in the depositing reservoirs

and lime water reservoir shewn on the Drawings, shall be composed of the best Portland cement, and clean, sharp river sand, in the proportion of one of cement to two of sand, well incorporated and mixed together with water into a stiff consistency as near to the place where it is to be used as possible, when it is to be immediately used. No cement mortar that has once commenced to set shall be chaffed up a second time or shall be used.

The mortar used in all the other portions of the work except the boundary walls shall be made as before described, but the proportion of cement used shall be as one of cement to three of clean, sharp river sand.

The mortar used in the boundary walls and the concrete for foundations of boundary walls to be composed in the proportion of 3 bushels of fresh burnt Halling grey stone lime to 9 bushels of clean, sharp river sand. The lime and sand to be well incorporated and mixed into a stiff mortar, not less than 16 hours nor more than 24 hours before it is used. Immediately before the mortar is used, half a gallon of Portland cement to every cubic foot of mortar shall be well mixed with it for such portions of the boundary walls as are retaining walls, and also for the gate piers.

No mortar that has become hard before it is required for use, after the Portland cement has been mixed with it, shall be used.

The walls and brickwork in every part shall be of the dimensions shewn to the scale or figured on the Drawings, and those portions below the surface of the ground shall be built with hard, sound, well and thoroughly burnt grey stock bricks. No place bricks or grizzles will be allowed. The whole of the walls above the ground line level shall be built with Gault kiln bricks, the exterior faces of building being built with the best quality of compressed Gault kiln bricks of one uniform colour. The other parts of the walls to be built with "wire-cut" Gault kiln bricks; and the exterior faces of the boundary walls and the inside of the buildings (where not rendered) to be built with bricks of one uniform colour to match the exterior faces of the buildings. The bricks used inside and outside must be all of one uniform size and shape.

The whole of the brickwork shall be laid in English bond. No joint of mortar shall exceed $\frac{3}{8}$ inch in thickness, and no difference of workmanship will be allowed in the inside and outside work.

The works to be carried up uniformly in level all round, and the whole of the joints shall be flushed up as solid as possible with cement mortar, and every course shall be grouted with thin Portland cement mortar as before described.

The inside joints shall be neatly pointed and drawn, except where the surface of the wall or brickwork is intended (as in the inside of the reservoirs) to be afterwards rendered, when the joints shall be left to be raked or cut out for $\frac{3}{8}$ of an inch in depth, and so as to form a proper key for the rendering.

The whole of the exterior of brickwork to have the joints neatly struck as the work proceeds.

The cornice to be executed according to Drawing in white Suffolk bricks.

The splay of plinth to be executed in white Suffolk moulded bricks.

All door and window frames, all templated and stone work, to be bedded and pointed in Portland cement mortar as before described, composed of one of cement to two of sand.

The discharging arches over all doors and window openings, where practicable, to be kept to the full thickness of the walls.

All the external arches to be gauged and set in fine cement putty, made of sifted Portland cement, and coloured black.

Cast-iron gratings of approved pattern to be provided, and to be built in where shown, both inside and outside the building, to the openings of ventilating flues, the inside of flues to be rendered as brought up with cement mortar.

Two tiers of hoop iron bond, set in neat Portland cement, to be inserted all round the buildings, where practicable, immediately below the wrought and cast-iron girders, and one tier of hoop iron bond to be set in similar manner, to be inserted all round the building immediately above the wrought and cast-iron girders, and similar wrought iron bonds, built in a similar manner, to be built in such other positions as are shewn on the Drawings. The hoop iron bond to be Tyerman's patent, 2 inches wide and No. 15 wire gauge in thickness.

The pipes where shewn through the wall of the reservoirs or buildings, and the ends of all the east and wrought-iron girders and machinery, to be set in neat Portland cement.

The coping to boundary wall to be semicircular brick 9 inches wide, set in cement.

The bottoms of the reservoirs (after being rendered as herein-after described) to be paved with one course of hard burnt sound paving bricks 2 inches thick, laid flat. The bricks shall be bedded full, and flushed with neat Portland cement, so that in lifting a brick from its position in the work no imperfection or vacancies can be discovered, but the impress of the brick shall be found distinct throughout.

The top joint shall be raked or cut out for $\frac{3}{8}$ of an inch deep before the cement sets, in order to form a key for the rendering over the bricks.

The floors of the store-room or workshop and coal store are to be laid with hard-burned paving bricks, set on edge in cement mortar, on a layer of concrete 6 inches in thickness resting on a dry and hard bottom previously prepared. The paving to be grouted in and laid with a slight fall towards gratings over sinks.

The floor of lime-house, being first carefully rendered over surface of concrete with Portland cement mortar, to be formed of one course of hard-burned paving bricks, laid flat in cement, with slight falls towards gratings over sinks. The engineer and other trades to be attended on.

The flues of the chimneys as brought up to be neatly rendered in cement mortar, same quality as used for the building, and the caps to be formed in brickwork as per drawing.

The sills of all the windows to be formed as shown of $\frac{3}{4}$ -inch slate, rubbed on the upper surface, and having rounded edges and angles set in cement, and pinned into the walls.

The drains to be formed of the size, and, as shown on plans, with the best glazed stone earthenware well-burnt drain socket pipes, laid to a good fall, well and securely jointed with cement, and forming a perfectly cylindrical and continuous line throughout.

The bed for the pipes to be prepared to uniform inclinations, and made sound with concrete, so that the inverts of the pipes and sockets may bear upon the concrete for the entire length. The sockets to be sunk in the ground so as to secure a firm bearing.

The pipes to be cleaned out as laid, and any cement at the joints, and all obstructions in them, to be removed.

The trenches to be filled up with the most suitable material, taken out in excavation, put in in layers not exceeding 6 inches in thickness, each layer being well watered and well punned.

PLASTERER.

The surface of the concrete in the bottom of all the reservoirs before the paving is commenced shall be rendered all over not less than $\frac{3}{8}$ of an inch thick with Portland cement gauged to a stiff consistency with half its own bulk of clean, sharp, grit, river sand, the sand having been first washed through a sieve 6 meshes to the inch. The falls or inclinations in the drawings being truly kept.

The inside of all the reservoirs, sides, and bottoms, when the whole buildings and works are completed, and the last thing of all, the joints between the bricks being first raked or cut out for at least $\frac{3}{8}$ of an inch in depth, to form a key for the rendering, and also the face of the brickwork having been first thoroughly cleaned and well washed with water, and all extraneous matter removed from the same, shall be rendered solid all over with neat Portland cement at least $\frac{5}{8}$ of an inch thick, trowelled perfectly smooth to a true plane or flat surface, with the inclinations shown on the drawings, and well compressed in working, the cement before being used to be well mixed and beaten into a very stiff consistency.

The top of the concrete on the roofs, before the asphalté be laid on, shall be rendered to a true plane with a rough surface, and to such falls as are shown on the drawings, with a mixture of 1 of Portland cement to 2 of sharp river sand, washed through a sieve 6 meshes to the inch.

The inside of the roofs or ceilings of the lower or service reservoirs to be rendered float, and set with Portland cement, and sand mixed in the proportion of one of cement to two of sharp river sand, washed through a sieve six meshes to the inch. The upper ceilings, viz., for the depositing and lime-water reservoirs, workshops, and lime-house, to be rendered and floated as for service reservoir ceilings, and "set" with neat Portland cement. The ceilings of the depositing reservoirs, the lime-water reservoirs, and the passage, to have a plain moulded cornice of 8 inches girth run all round in same material as that described for the rendering of the ceiling.

Render in Portland cement the whole of the reveals and soffits to the windows and door openings requiring it, having a

head marked on edge of same flush with brickwork, and finish the surface with neat improved Portland cement.

Put to the walls of closet Portland cement skirting 6 inches high, with $\frac{3}{4}$ return, and arris and colour the same.

The whole of the interior of the buildings and reservoirs, excepting the walls above the tops or landings of the lime-water and depositing reservoirs to be whitened out with two coats of blue lias lime and Portland cement mixed in the proportion of 2 of lime to one of cement. A Portland cement skirting 9 inches high, with plain moulding run on top, shall be put round floors of depositing and lime-water reservoirs and the staircase.

COVERING FOR ROOF.—ASPHALTE.

The whole of the upper surface of the concrete composing the roofs, after being regulated as before described to a true plane, and to the falls shown on the drawings, together with the sides of the walls above the roofs to the under portion of the coping, and before the coping is put on, shall be covered in a perfect manner with the best Seyssel asphalté $\frac{5}{8}$ of an inch thick to be done by the Seyssel Asphalté Company.

The cesspools leading to the rain-water pipes to be also lined with asphalté as before described.

The junction with the cast-iron pipes, as shown, shall also be hedged in asphalté, so as to make a water-tight junction with the cesspools.

The asphalté shall be solid in every part without air-holes or hubbles, and be carefully joined at the arrises, with the asphalté carried up the sides of the walls and into the cesspools, so that no water can anywhere get through the asphalté or the junction with the asphalté.

The cesspools, as shown, to be covered with strong cast-iron galvanized gratings, and the top of the asphalté on roofs to be covered the last thing to the height shown on drawings with a layer of well-washed gravel stones, no stone of which shall be too large to pass in any direction through a ring one inch diameter.

MASON.

The paving shown on the tops of the depositing and lime-water reservoirs, &c. shall be the best Yorkshire stone, at least 3 inches thick and 3 feet wide, and in such lengths as will enable the stone at the joints to be supported by the cast-iron brackets as shown on the drawings.

The upper surface and edges shall be fair tooled all over; the paving to be set in Portland cement mortar to the falls shown on the drawings; the joints to be flushed up with neat Portland cement.

The roof of watercloset and urinal to be formed with half-brick arch, set in cement, and covered with concrete, and asphalted as shown in detail.

Small channels, of form of segment of a circle, as shown on the drawing, shall be cut in the paving, to carry off the water to the sinks when paving is washed and cleaned, as shown.

The landings for the passage to be the whole breadth of the passage (4 inches thick), and of suitable widths. The top surface to be fair tooled all over, and set with and joints flushed up with Portland cement.

The bottom of each column in the service, and also the depositing reservoirs, shall be bedded on Yorkshire stone at least 4 inches thick. The base of column to fit quite fair and close, so as to take an even bearing all over.

The Yorkshire stones on which the columns are supported being set in neat Portland cement.

A washer of sheet lead, weighing 6 lbs. to the foot, the whole size of the bottom of columns, being introduced between the iron and the stone where the iron would otherwise bear on the stone.

The coping to be York stone, quarry worked, weathered and throated both sides (average 3" thick), and set in cement mortar.

Put to all entrances tooled York stone thresholds 8 inches thick, the width of walls, and 18 inches longer than the openings morticed for door frames, and set one inch above floors. All internal thresholds to be 4 inches thick, the width of wall, and 18 inches longer than openings.

Pave watercloset and urinal and covered passage near watercloset with 3-inch York stone, laid on concrete, and grouted and pointed in Portland cement mortar. A semicircular channel to be cut in stone in the urinal, and a perforation for a 5-inch trap, the trap to be provided and approved, and to be connected with the drains.

Put flight of solid York stone steps as shewn, and built in walls inside the passage leading to lime-water reservoir and lime-house.

Put flight of solid York stone steps as shewn to entrance door leading to passage of lime-house, with ends let into brickwork.

The space outside of aforesaid entrance door and the entrance door to workshop or store, &c., as shewn on plans, to be paved, with proper fall, with 3 inches York stone set on 6 inches of concrete, and curbed with tooled York stone 9×5 , close jointed together. Provide and fix two testing basins, &c. complete, as shewn on drawing No. 25, and composed of black enamelled slate, with wastes and plugs, and waste-water pipes complete.

Provide and fix two tooled York sink stones 24 inches square and 8 inches thick, to be perforated and rebated and channelled for 12 inches iron grating, with trap, and 2 ditto 12 inches square and 6 inches thick with 6" iron gratings, and traps, in lime-house and workshop.

Put to the urinal $1\frac{1}{2}$ inch rubbed slate slab 3 feet long, to project from wall 8 inches at top and 3 inches at bottom; put $1\frac{1}{2}$ inch returned ends grooved to receive the same, securely fixed together with copper angle rims, and to walls with copper cramps as required. Provide and fix in lime-house where directed a solid slate sink $3' 0'' \times 1' 6''$ and 6" thick, properly dished, with lead pipe properly trapped into the down pipe from roof. Ditto, ditto, in workshop.

The caps and bases of the piers of gates to be of Portland stone, 9 inches thick, worked as shewn.

The whole of the foregoing masonry to be cleaned down, and left clean and perfect on completion of the works.

CARPENTER.

All the timber used to be of the best description of yellow Memel fir, to be well seasoned, free from sap and dry, to contain no large loose or dead knots, shakes, or other imperfections, to be cut square, and to measure the full sizes specified when fixed in the building. The joiners' work to be of the best description of Christiana deals, well seasoned, free from sap and dry, to contain no large loose or dead knots, shakes, or other imperfections.

Provide all necessary temporary supports, struts, and shores, &c. required. Fix all iron work of every description.

Provide good and secure casing for all stone work required to be protected from injury during the execution of the works, and any accident arising from neglect in this respect to be made good.

Put a sufficient number of wood bricks as required for fixing door and window frames and other joiners' work.

The window openings in the passage leading to lime-water reservoir, the store room or workshop, and the lime-house and lime-store, and over hot-water boiler, to be fitted with $1\frac{3}{4}$ -inch moulded sashes, double hung, with best copper lines, iron weights, and brass axle pulleys suitable for the copper lines, prepared deal cased frames, the frames to be semicircular, the windows being made square to the inside, to allow lower sash being thrown completely up, to be fitted with best sash fastenings, brass furniture, put small band moulding round same where required.

Brass pulleys, hooks, and strong cords to the sashes of windows in east end of passage only, for opening and closing same.

The inner doors to be 2 inches deal square and moulded framed 4 panels (2 below and 2 above), the upper panels of the doors between the lime water and depositing reservoirs having only one large panel above for glazing, to be glazed with polished plate glass $\frac{1}{4}$ -inch thick, fitted with shifting beads, and screws.

The whole to be hung with good strong $3\frac{1}{2}$ inches wrought butts, to rebated and beaded fir frames $4\frac{1}{2} \times 4$ inches, and rebated and beaded transoms, 6 inches mortice locks, spring latch, and bronze furniture, and architrave moulding round door frames.

The outside door for entrance to passage leading to lime-water reservoir to be deal-framed, and braced with styles and rails $2\frac{1}{2}$ inches thick, with 1 inch rebated and beaded filling in, backed with 2 horizontal and 2 diagonal braces, to be hung with best wrought $4\frac{1}{2}$ inch butts of Collinge's make, to rebated and beaded fir frame $5 \times 4\frac{1}{2}$ inches.

The outside door to workshop to be deal framed and braced with styles and rails $2\frac{1}{2}$ thick, with 1 inch rebated and beaded filling in, backed with one horizontal and two diagonal braces; to be hung with $4\frac{1}{2}$ inch best wrought iron butts of Collinge's make, to rebated and beaded fir frames $4\frac{1}{2} \times 4\frac{1}{2}$. Fit up the watercloset with $1\frac{1}{2}$ inch deal riser, $1\frac{1}{4}$ inch deal seat with rounded edges, $1\frac{1}{4}$ deal mitre clamped flap hung with 1 pair of 3 inches

wrought-iron butts in $1\frac{1}{4}$ inch deal framed and beaded frame; put $\frac{3}{8}$ inch skirting round seat, 5 inches wide, with external corners rounded; cut perforation for seat and handles.

CISTERN.

Provide and fix in lime-house a 2" wrought deal dovetailed cistern, with strong cover to same, to hold 60 gallons of water; and one over watercloset, to hold 40 gallons of water. Put angle fillets, and attend on plumber and other trades.

ENTRANCE GATES.

The entrance gates to be framed of 3' deal styles and rails, the upper to be curved as shown on drawing, with moulded capping above same, and filled in with 1" rebated and beaded battens, backed with diagonal and horizontal braces, the gates to be double hung (having meeting styles, rebated and beaded), with a pair of "Collinge's Patent" 4 feet hinges to side pier, 1 strong 5 feet swing iron fastening bar, with iron stays, and a padlock by Chubb provided, also a wrought-iron stay bar and two proper oak stops.

No. 2. 3 feet barrel bolts with iron eyelets fixed on the inside of the gates, and an approved strong iron spring catch on outside.

A small wicket gate corresponding to the adjoining work, framed in the foregoing gate, and hung with a small pair of "Collinge's Patent" hinges, and provided with a small mortice lock of Chubb's make, and bronze furniture as directed.

GLAZIER.

Fill in the whole of the sashes and openings throughout with polished British plate glass at least $\frac{3}{16}$ of an inch thick, to be puttied, sprigged, and back puttied into the sashes, to be carefully bedded in putty to the openings without sash frames, the walls plugged, and the glass secured by wrought wainscot fillets.

All to be left perfect at the completion of the works.

PLUMBER.

Provide the lead for footings of iron columns before described and for other trades. Line the cistern with 6 lb. milled lead throughout, soldered at angles, and close copper nailed to all edges.

Provide 40 yards $\frac{5}{8}$ " inch lead pipe 7 lbs. per yard run, to lay on water to water tanks or cisterns, with stopcock on same at main.

Provide for fixing same as may be directed, also two $\frac{1}{2}$ -inch Lambert's ballcock with copper ball.

Lay on water from cistern to pan of closet with $\frac{3}{4}$ lead pipe weighing 9 lbs. to yard run; lay on water to urinal and $\frac{5}{8}$ -inch lead service pipe 7 lbs. to yard run, and $\frac{1}{2}$ -inch stopcock.

Provide and lay on 12 yards of $\frac{1}{2}$ -inch lead pipe 6 lbs. per yard run, with screw-down brass tap, and fix same in buildings wherever directed.

The watercloset pan is to be fitted with best pan apparatus, blue basin, D traps of 7 lbs. lead, and service boxes securely fixed in lead; cistern to have a strong lead service pipe from cistern to basin as before described.

The apparatus to be procured of Messrs. Warner & Son, 8 Jewin Crescent, and to be of the best quality supplied by them.

SMITH.

Provide the iron work described in other trades.

Provide and fix four small cast-iron stoves with iron flue pipes from same, viz., one in each corner on gallery of depositing reservoirs.

Provide and firmly fix as shown the cast-iron down and overflow pipes, according to particulars given in plans, all complete, with cast-iron gratings for cesspools in roof.

Provide No. 4 plain, strong, scrapers, and fix two at entrance to passage leading to lime-water reservoir, one to door leading to store-room or workshop, and one to door of covered passage.

Provide cast-iron air bricks as shown.

Provide and fix 3 mortice spring locks of Messrs. Chubb's make, one to the front entrance doors, namely, the front door to passage leading to lime-water reservoir, and the front door to workshop or store-room, and one to door opening on the common; and provide 3 master keys, in addition to the usual keys, that will pass all the locks.

Provide 48 cast-iron standards with locks, and twisted oval chain, and fix same as shown round landings of depositing and service reservoirs.

PAINTER.

Knot stop and paint 4 times in best hard oil and varnish colour all wood, iron, or other work usually painted, to be finished of such tint or tints as may be directed.

GENERALLY.

The cast-iron girders and columns, the cast-iron brackets to carry the paving round reservoirs, the inlet and outlet pipes to the reservoirs, and the wrought-iron girders to carry the roofs and bottom of depositing reservoirs, and other iron work connected with these parts, together with all the machinery and iron pipes, as shown, will be provided by Her Majesty's Principal Secretary of State for the War Department, delivered at the railway station at Woolwich; but the carting of the same from

the railway station to the site of the intended works, and the building in and fixing of the same, in which he will be assisted by the contractors for the iron work when requisite, without charge, to be done by the contractor, and to form part of this contract.

Note.—The quality of the sand used throughout will be required to be the best clean sharp-washed river sand, and where used for cement mortar or rendering to be washed through a sieve 5 meshes to the inch (except where a finer sieve is required to be used), and none other sand will on any account be allowed to be used. The contractor must fully understand that the efficiency and water-tightness of the reservoirs depends upon the work being of the soundest description, and more especially upon the care taken to execute the rendering of the inside of the reservoirs in the soundest and most perfect manner, and that he is responsible for the water-tightness of the same.

LONDON:

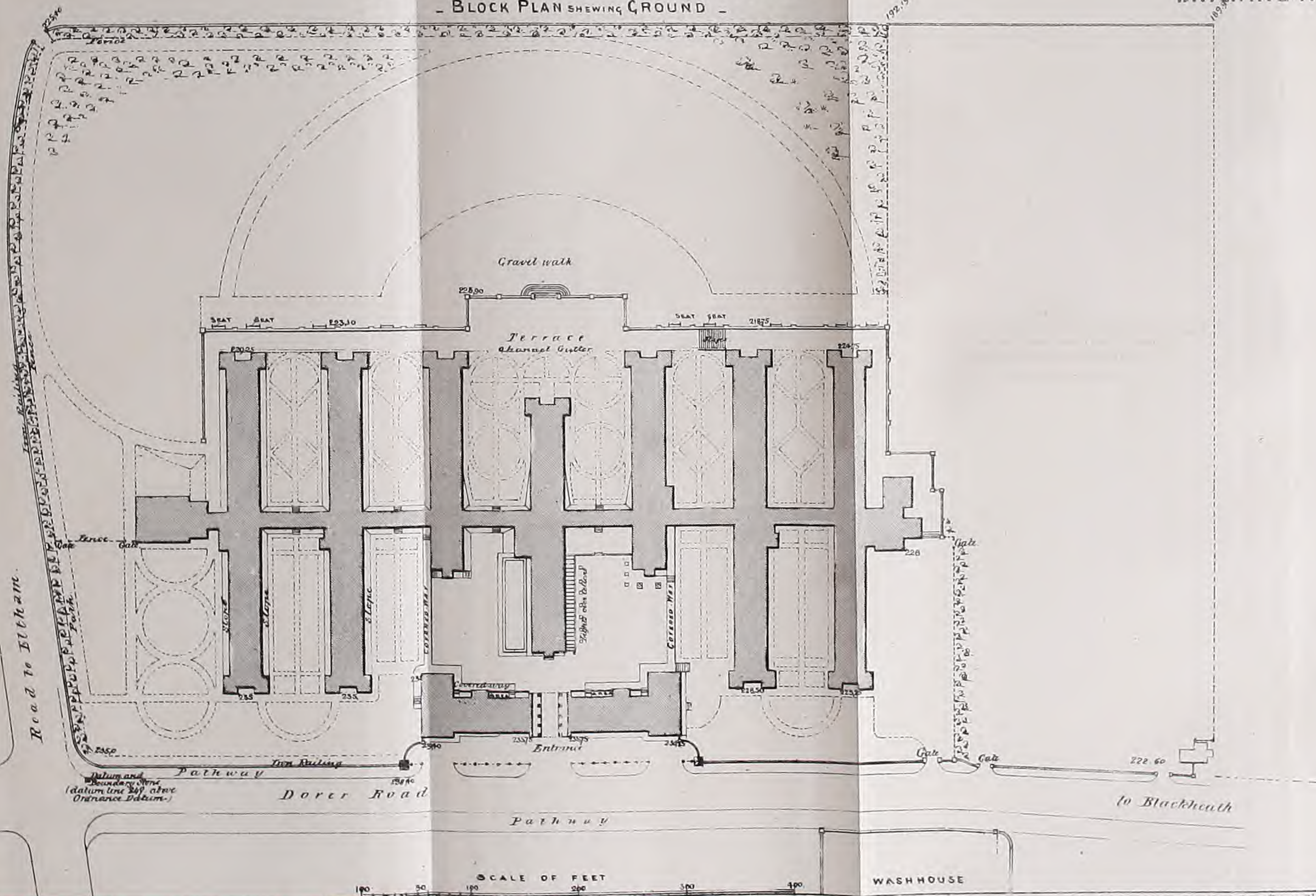
Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

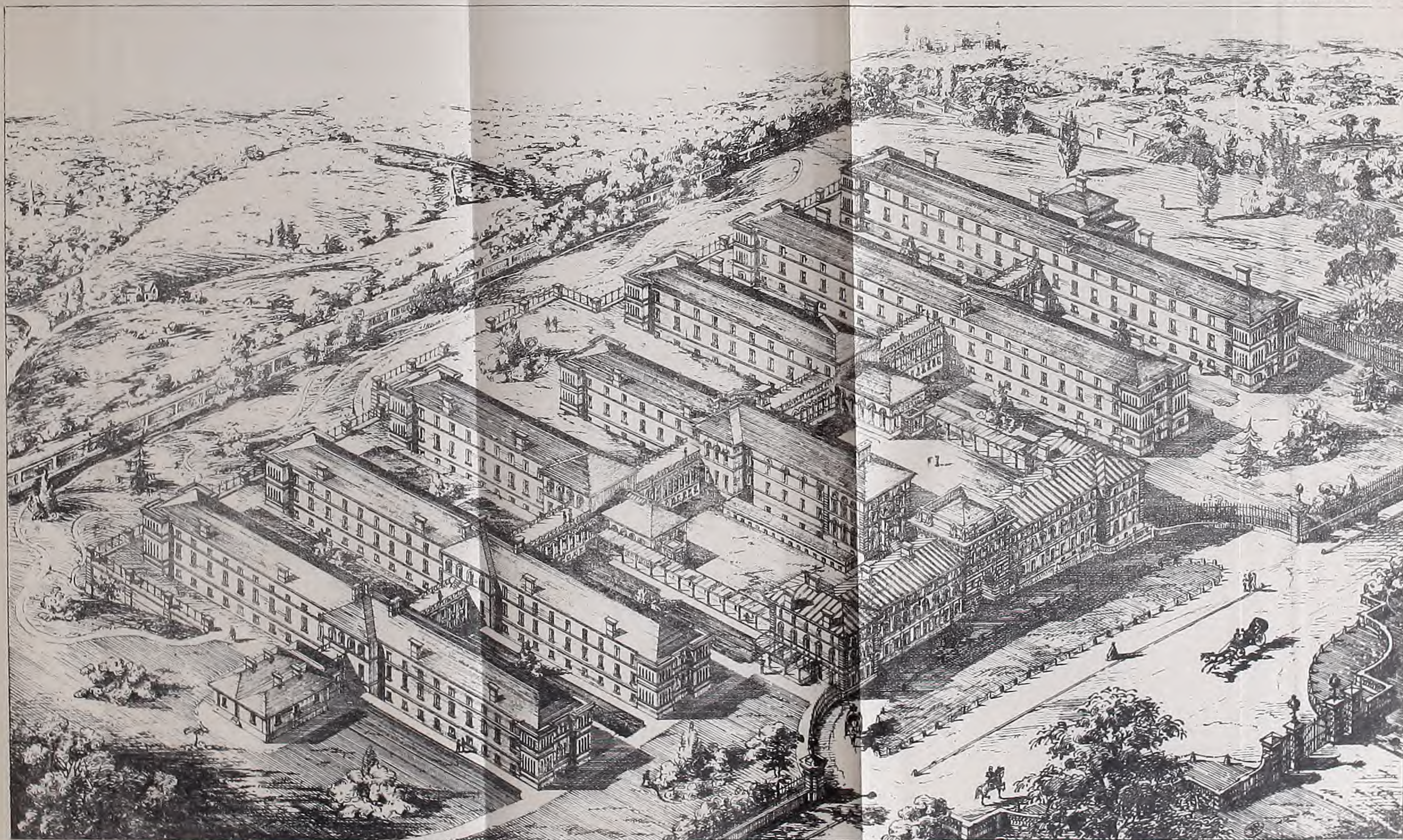
[9495.—350.—11/65.]

HERBERT HOSPITAL WOOLWICH

- BLOCK PLAN SHEWING GROUND -

DRAWING N^o 1





THE HERBERT HOSPITAL. WOOLWICH.

HERBERT HOSPITAL WOOLWICH.

DRAWING No 3.

CONVERT into Water Course
50 feet beyond Boundary Wall

CESSPIT

9 Drain Pipe

9 INCH DRAIN FROM FOUNDATIONS

9 INCH SEWAGE DRAIN PIPE

12 INCH DRAIN PIPE

6" drain from foundations

6" Sewage Drain Pipe

Rain Water Drain

PAVILION A

Sewage Drain

PAVILION C

6 inch

4 inch

From Foundations

Sewage Drain

PAVILION E

9" Drain Pipe from Foundations

6" drain

6" Sewage Drain

PAVILION F

1 R.W.

6" Sewage Drain

PAVILION G

6" drain from Foundations

12 INCH DRAIN PIPE

Rain W. Drain

6" Rain Water Drain

6" inch

6" inch Sewage Drain Pipe

6" inch Sewage Drain Pipe

Rain Water Drain

6" Sewage Drain

PAVILION D

PAVILION E

PAVILION F

PAVILION G

PAVILION H

PAVILION I

PAVILION J

PAVILION K

PAVILION L

PAVILION M

PAVILION N

PAVILION O

PAVILION P

PAVILION Q

PAVILION R

PAVILION S

PAVILION T

PAVILION U

PAVILION V

PAVILION W

PAVILION X

PAVILION Y

PAVILION Z

PAVILION AA

PAVILION AB

PAVILION AC

PAVILION AD

PAVILION AE

PAVILION AF

PAVILION AG

PAVILION AH

PAVILION AI

PAVILION AJ

PAVILION AK

PAVILION AL

REFERENCE TO DRAINS

- marked thus, are Sewage Drains
- " " " Rain Water do
- " " " foundation do

REFERENCE

- | | |
|---------------------|---------------------------|
| A ORDERLIES STAIRS | I PROVISION STORES |
| B OFFICERS SERTS | K SCULLERY |
| C COAL STORE | L DISPENSERS ROOM |
| D OFFICERS KITCHENS | M LIFTS FOUL LINEN & DUST |
| E VEGETABLE STORE | N N.C. OFFICERS QUARTERS |
| F WINE CELLAR | O WATER CLOSETS |
| G BEER CELLAR | P CLERKS ROOM |
| H STEWARD'S ROOM | Q WAITING ROOM |

ADMINISTRATIVE BLOCK M.

12 INCH DRAIN CONVEYING INTO MAIN SEWER
(SCALE 60 FEET TO AN INCH)

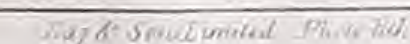
PLAN OF BASEMENT SHOWING DRAINAGE

RAIN WATER TANK

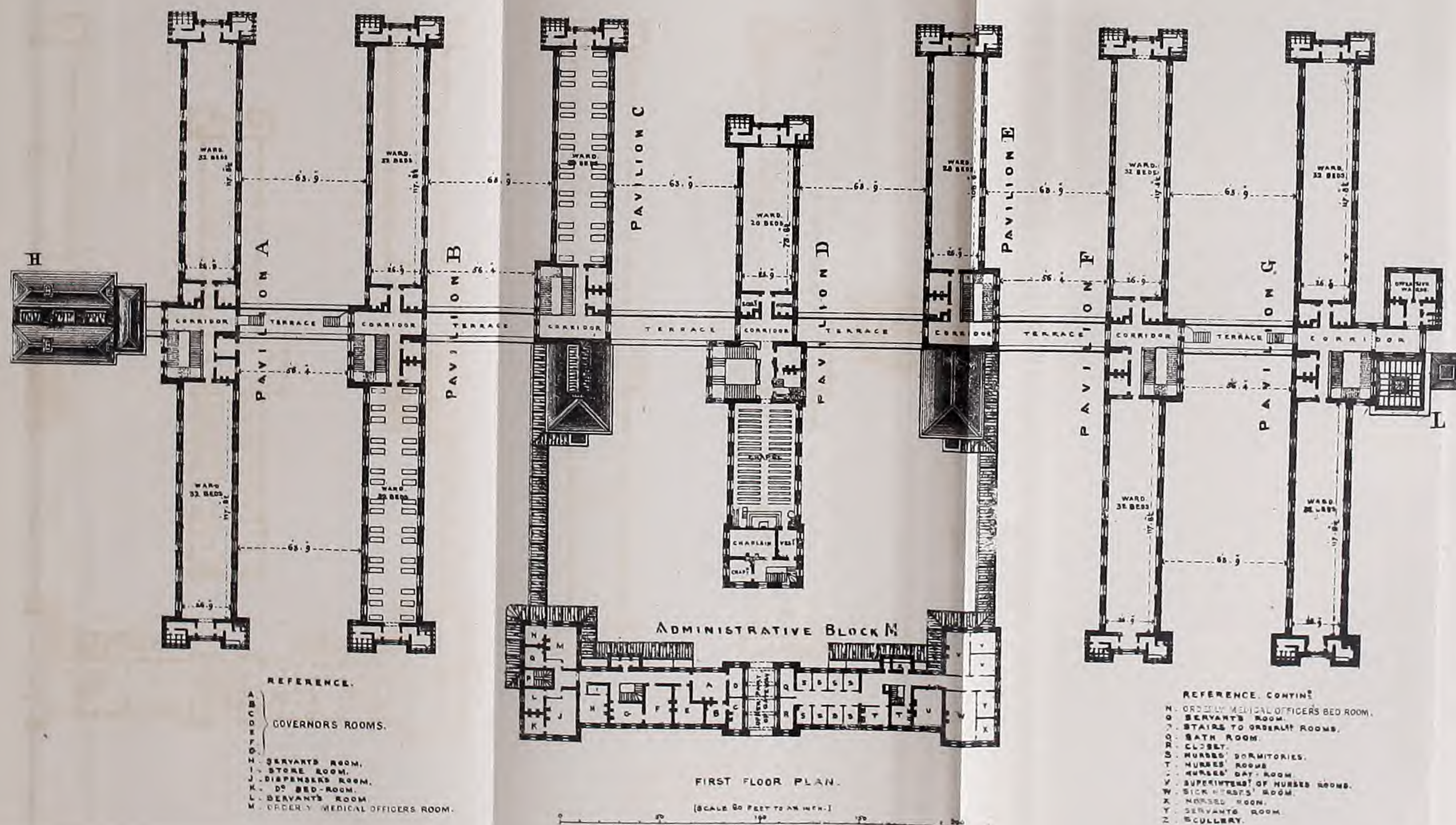
MAN HOLE
OVER MAIN DRAIN

Day & Son Limited Photo-Lith

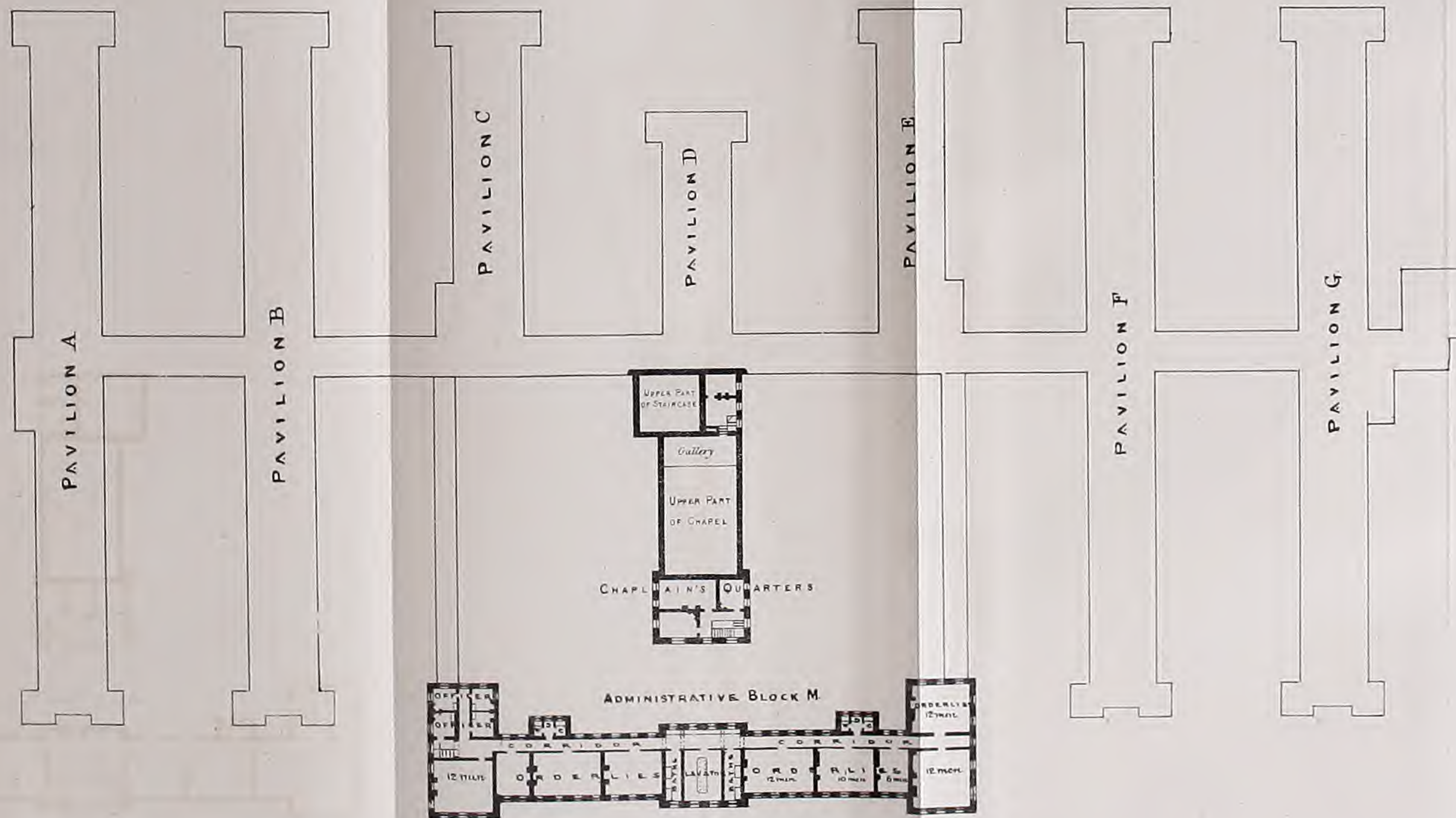
DRAWING N° 4



HERBERT HOSPITAL WOOLWICH.



HERBERT - HOSPITAL. WOOLWICH



SECOND FLOOR PLAN

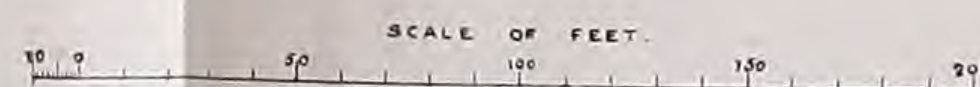
SCALE 60 FEET TO AN INCH



HERBERT HOSPITAL WOOLWICH.



SECTION OF TERRACE WITH ELEVATION OF ENDS OF PAVILIONS.



SECTION OF CORRIDOR SHEWING LEVELS OF BOILER - HOUSE, KITCHEN, &c.

HERBERT HOSPITAL WOOLWICH.

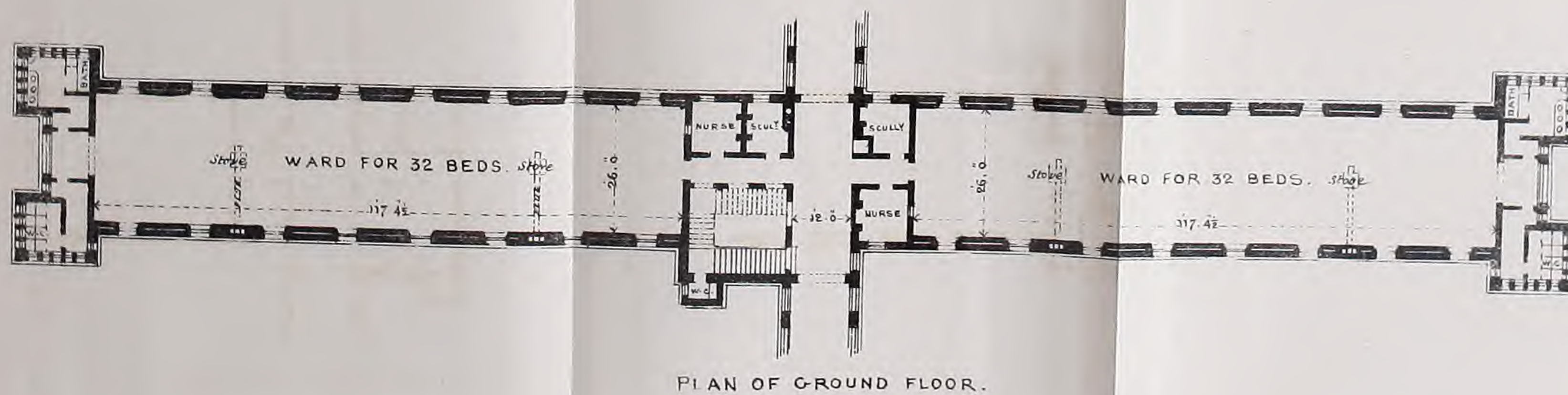
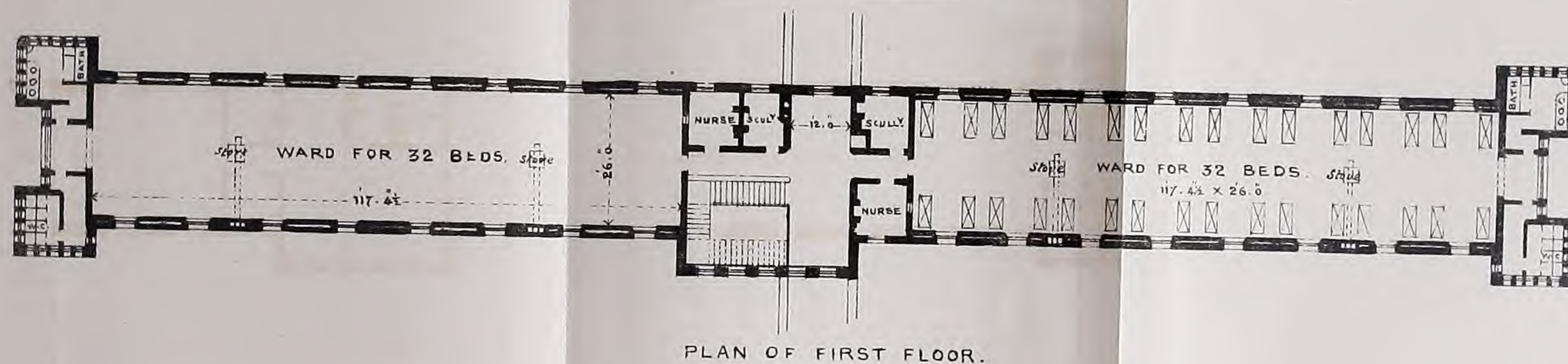


ELEVATION OF FRONT BUILDING WITH ENDS OF PAVILIONS, SHEWING LEVELS.

SCALE OF FEET.
0 50 100 150 200

HERBERT HOSPITAL WOOLWICH.

PLAN OF DOUBLE PAVILION SHEWING WARDS



10 5 0 10 20 30 40 50

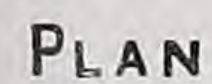
SCALE OF FEET.

100

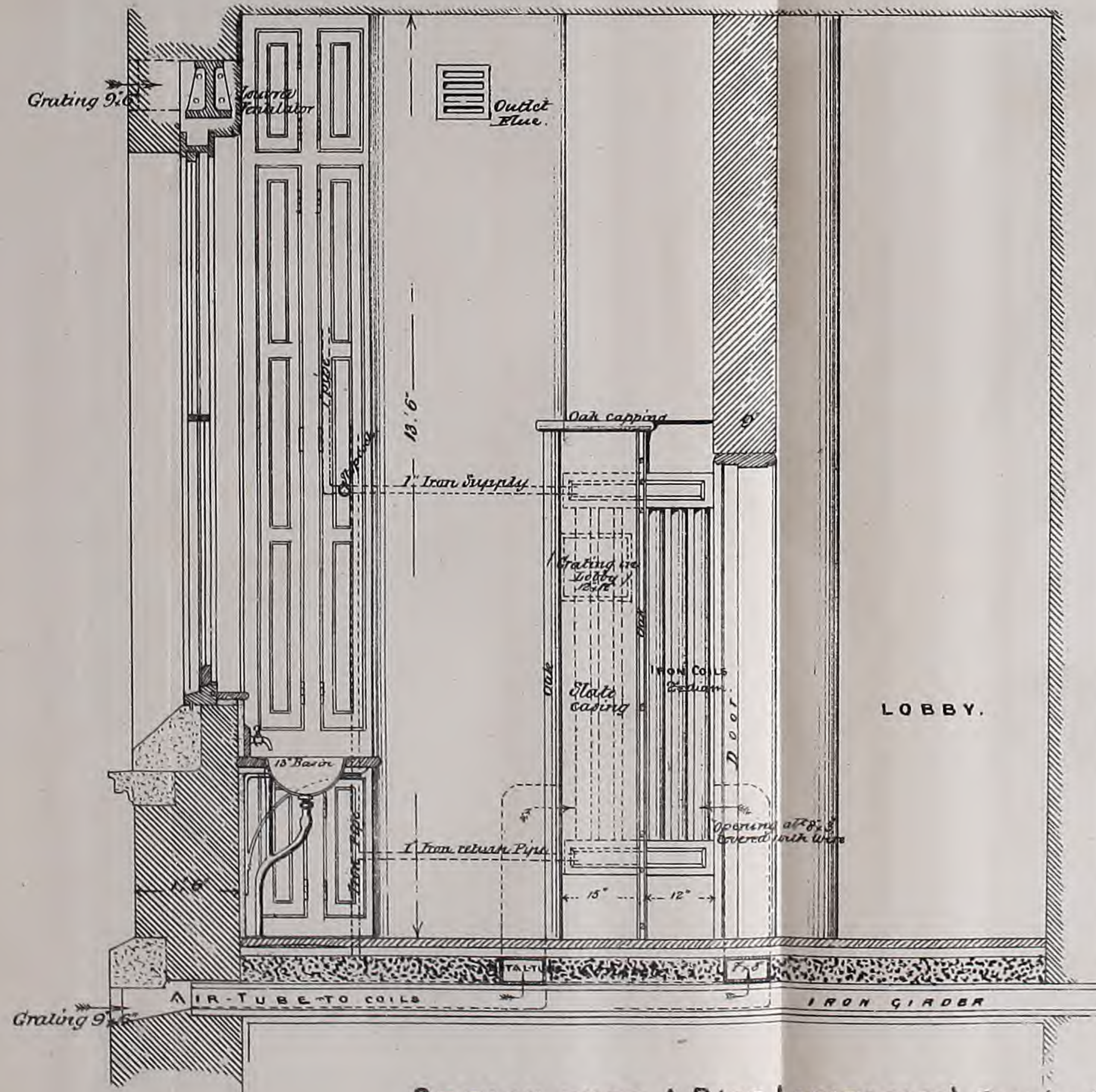
150

200

WARD
26' 0"

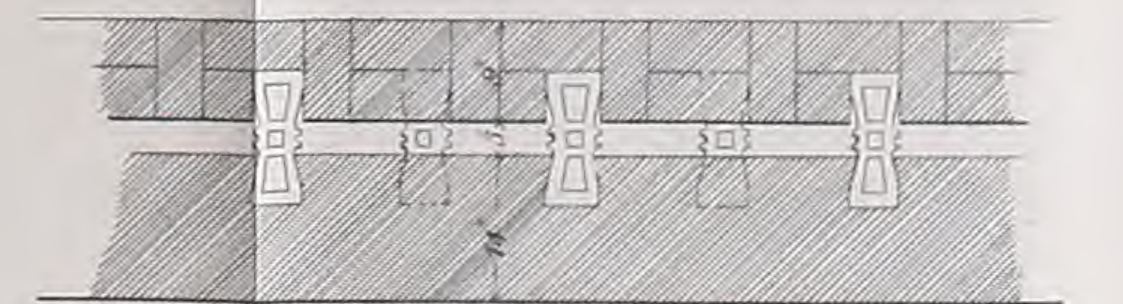
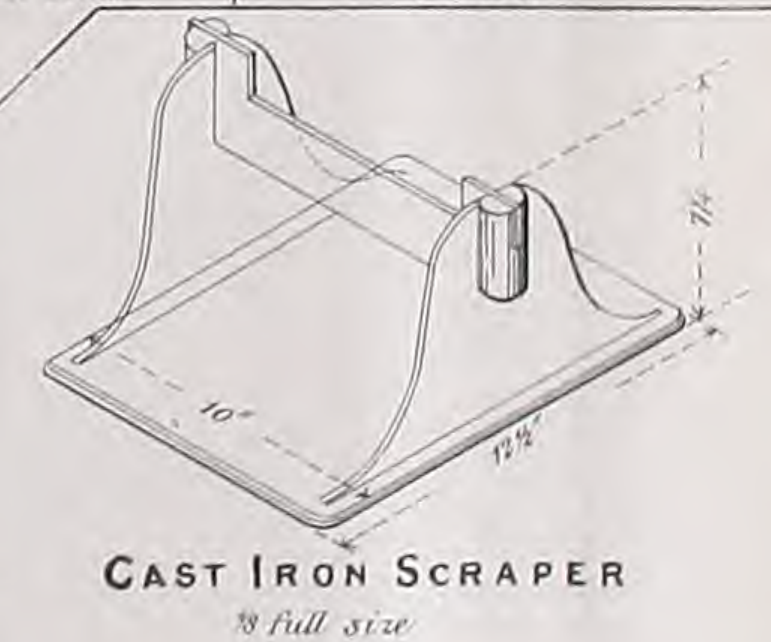
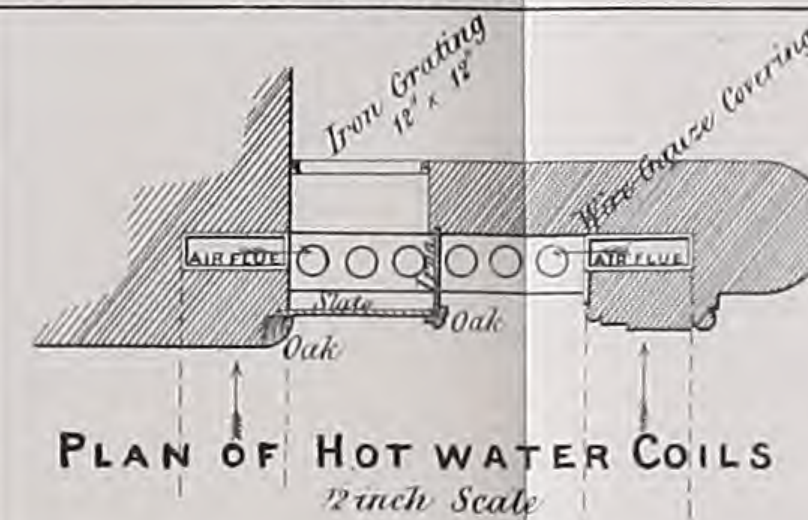
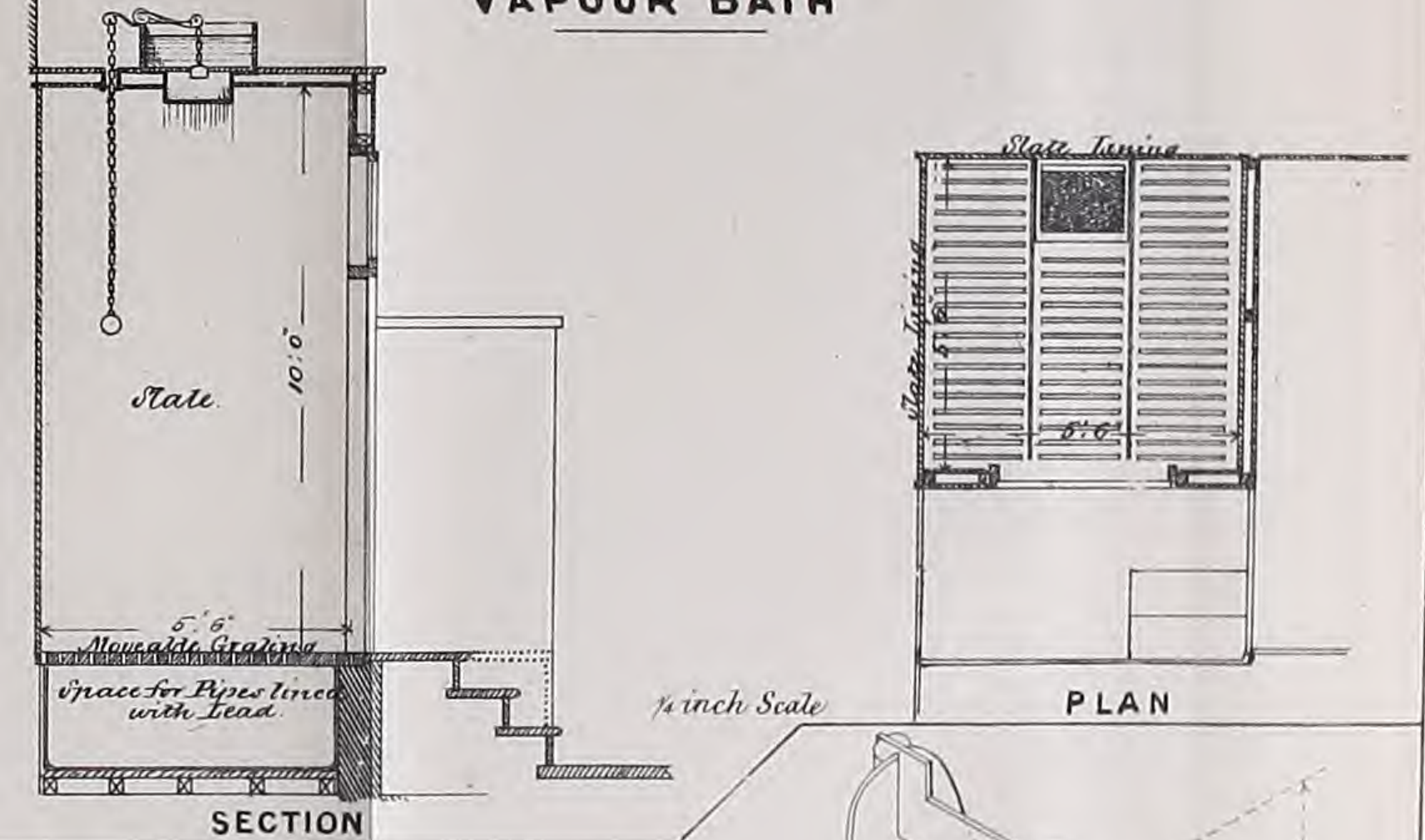


HERBERT HOSPITAL WOOLWICH.
LAVATORY &c



SECTION THRO A B OF LAVATORIES' *Drawing No. 10.*
Scale $\frac{1}{2}$ inch to a foot.

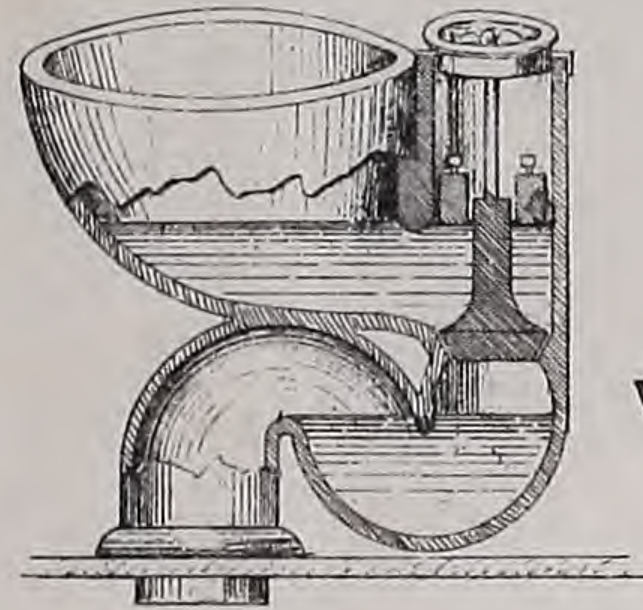
VAPOUR BATH



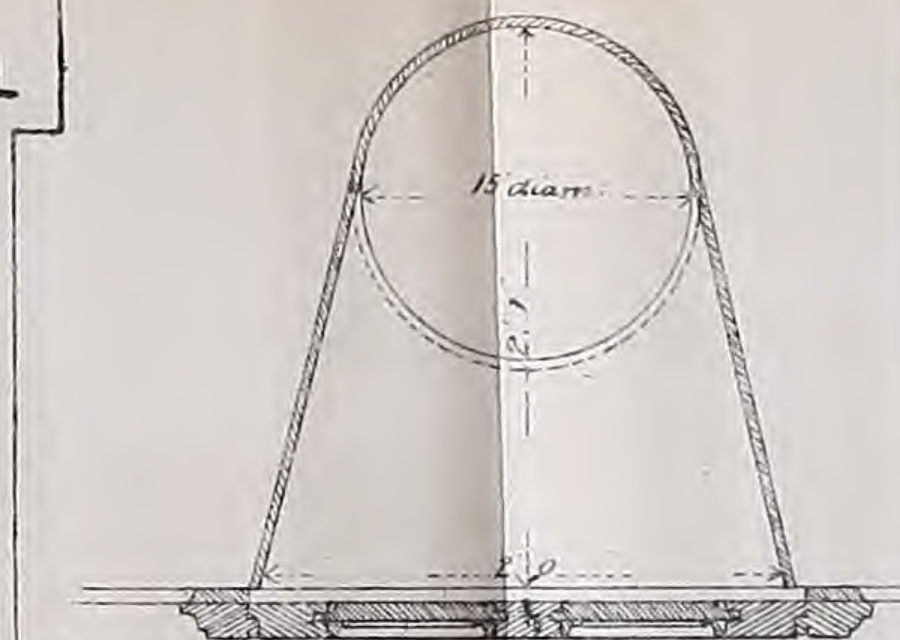
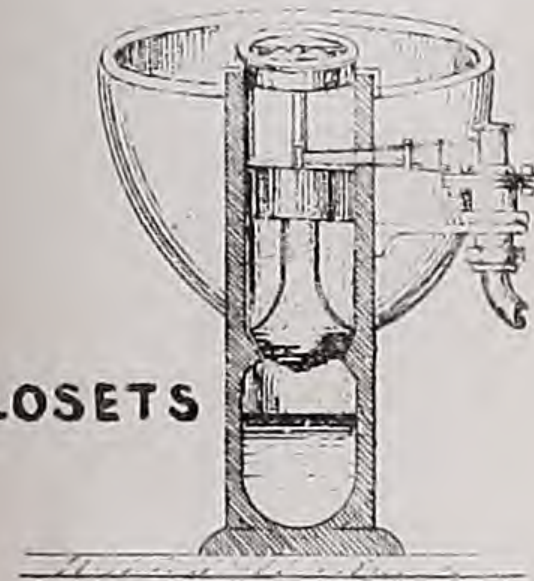
PLAN OF HOLLOW WALL *1/2* Inch Scale

HERBERT HOSPITAL

DRAWING N° 12.



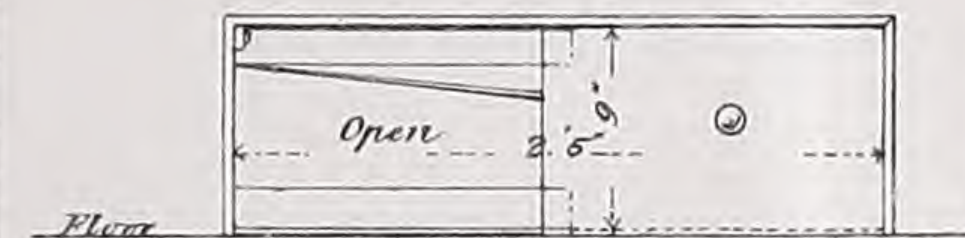
SECTION OF
VALVE WATER CLOSETS



PLAN OF FOUL LINEN SHAFT

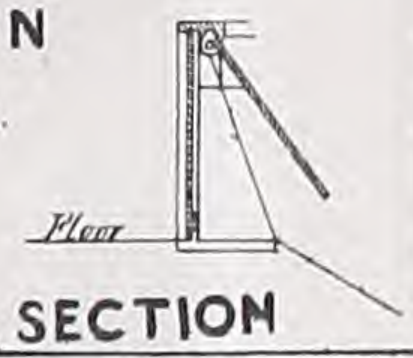
See Drawing 10 showing metal shoot at foot of shaft
or conveying dust into casks.

PLAN OF DUST SHAFT
'Brought Iron Door and Frame.'

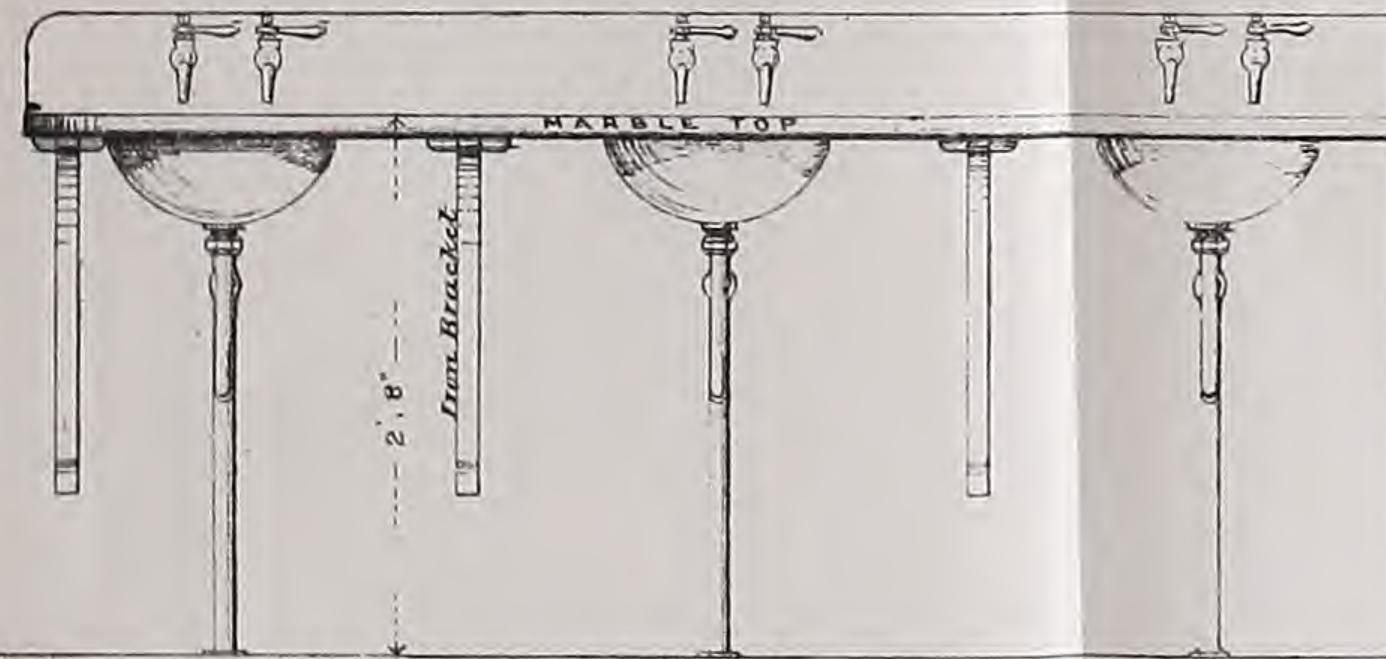


ELEVATION

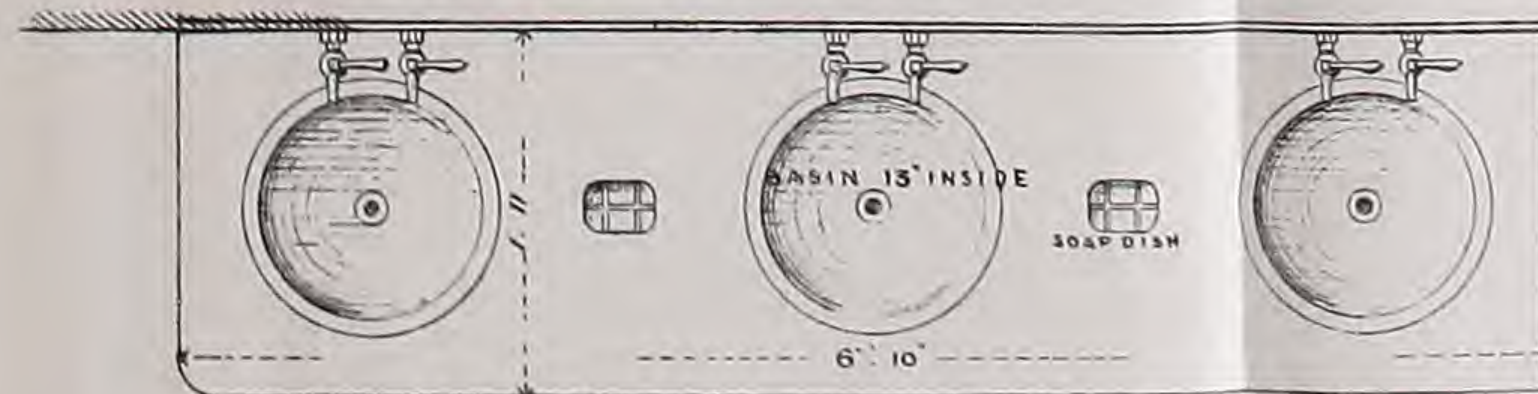
Inch scale.



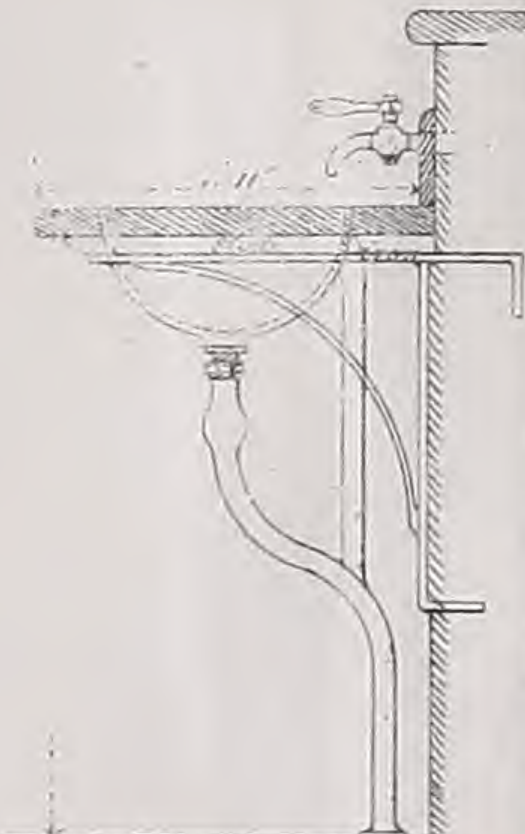
SECTION



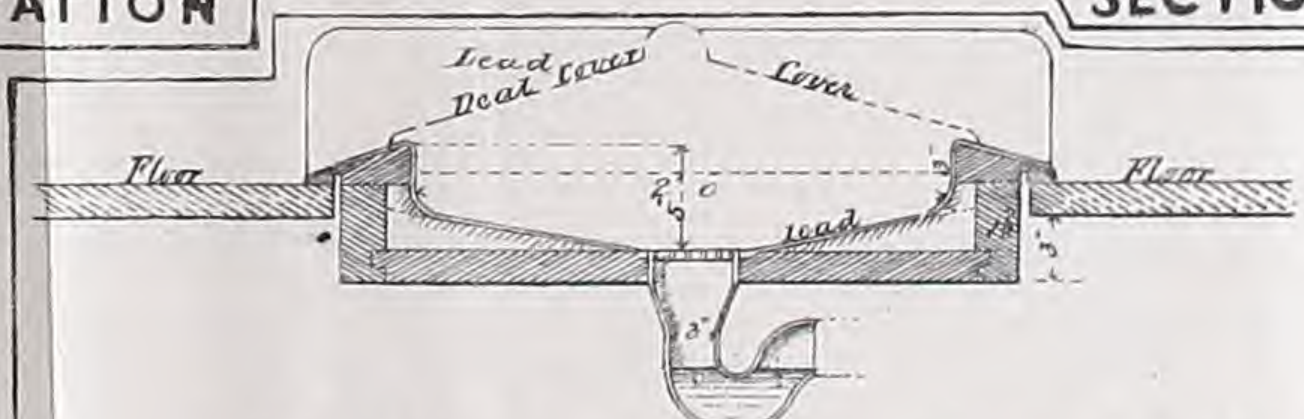
ELEVATION OF WASHING BASINS 3/4 INCH SCALE



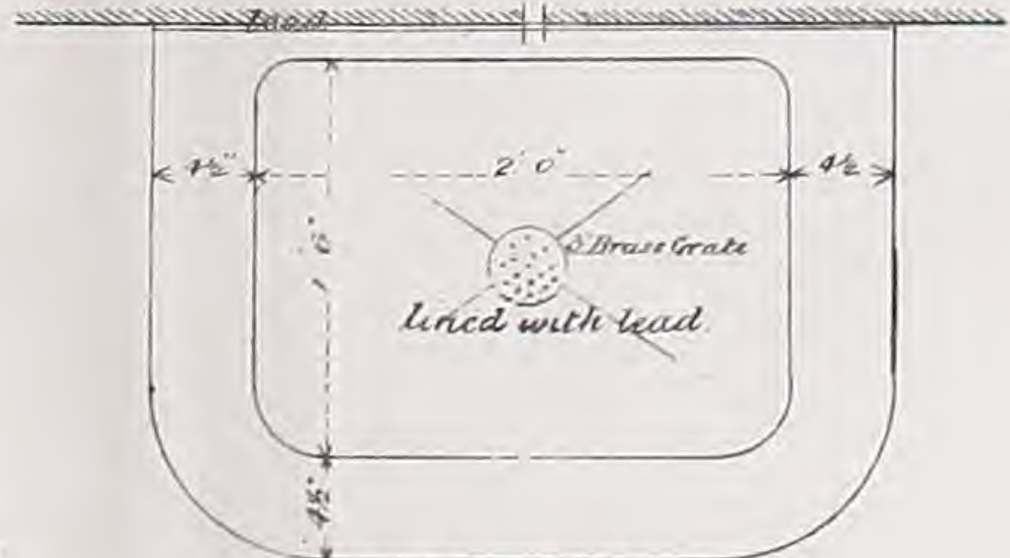
PLAN OF TOP (White marble)



SECTION OF BASINS

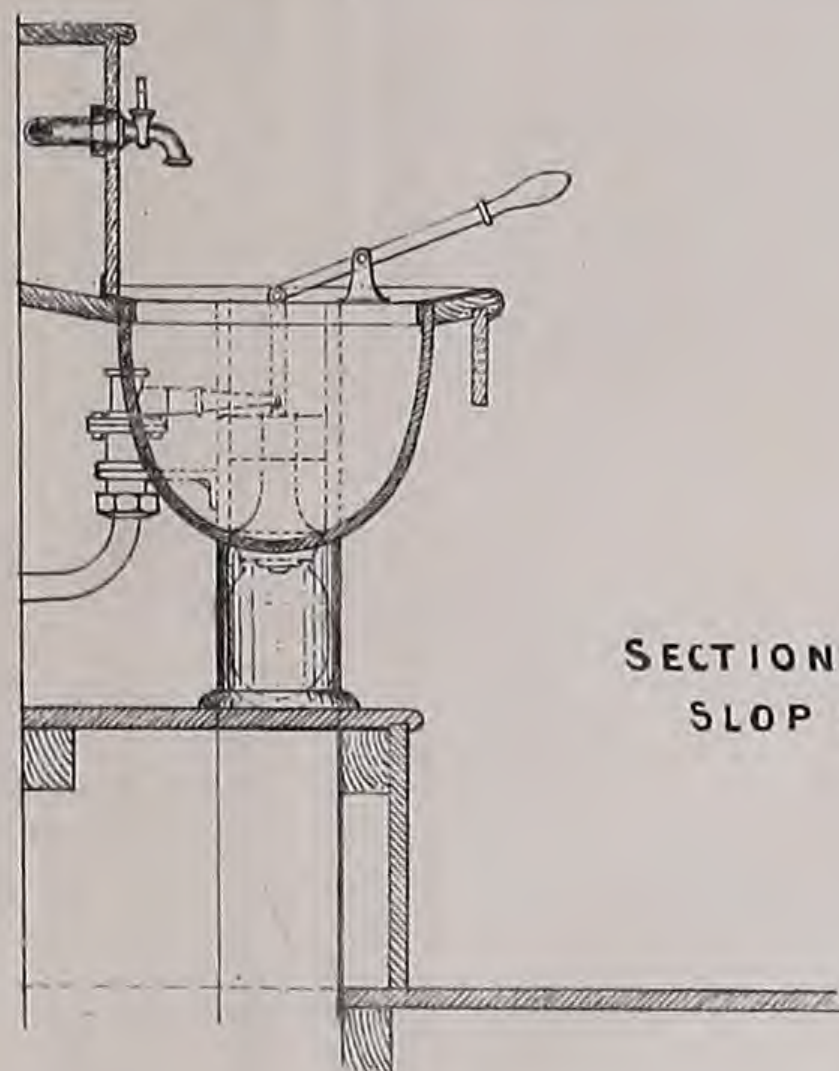


SECTION OF SINK FOR EMPTYING PORTABLE BATH

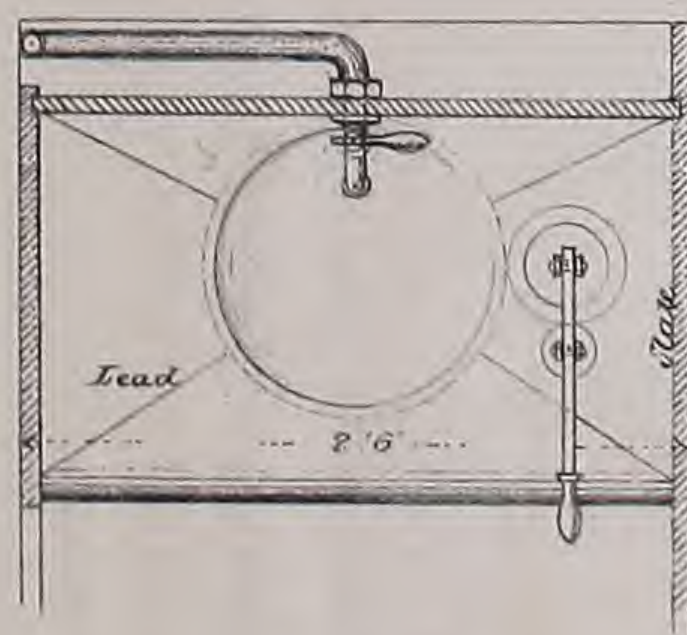
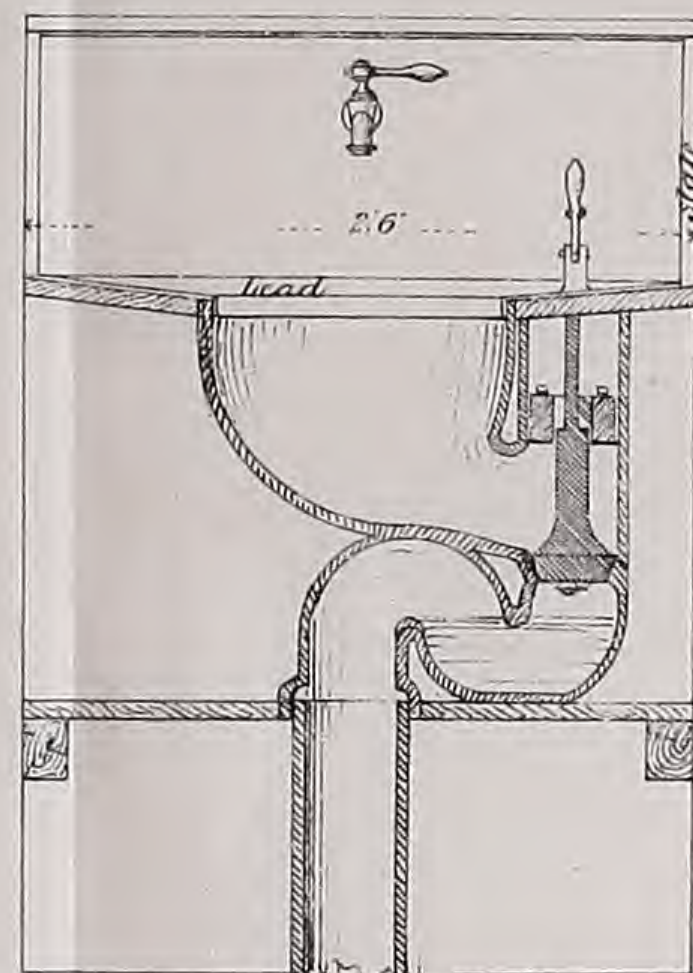


PLAN

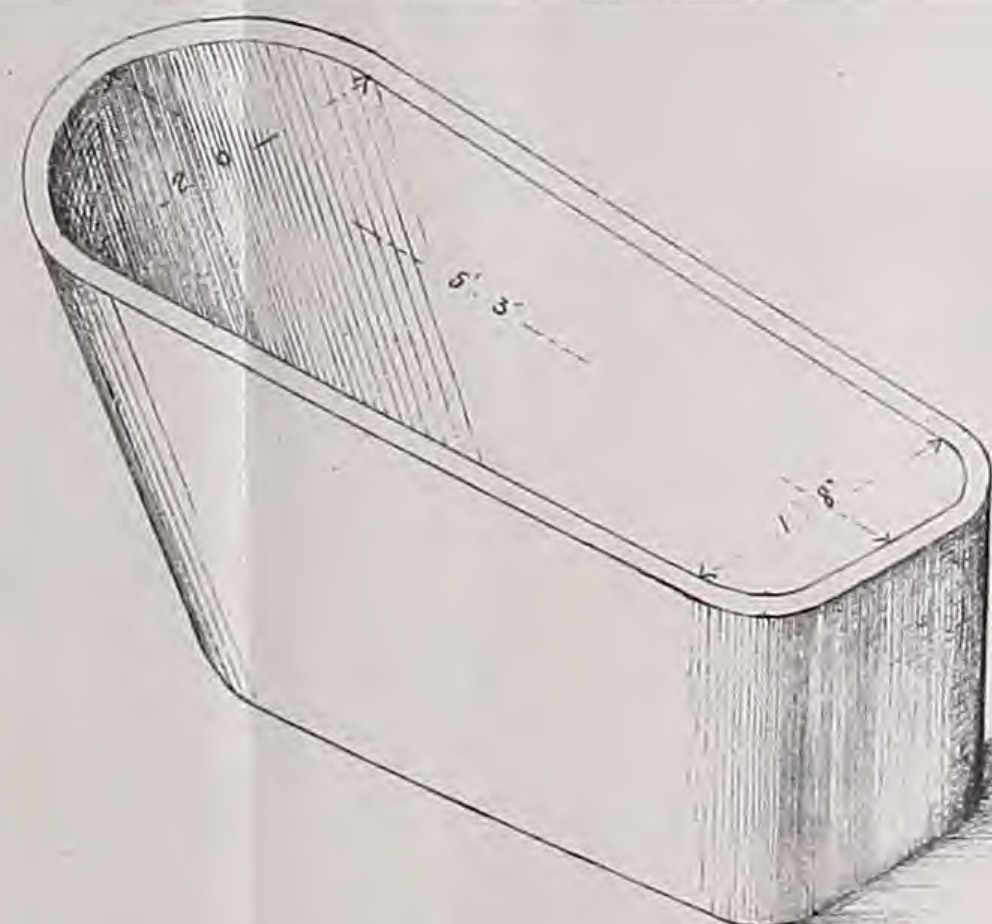
HERBERT HOSPITAL WOOLWICH



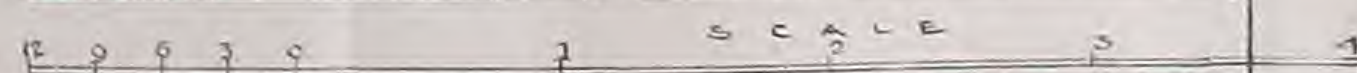
SECTIONS OF
SLOP SINK



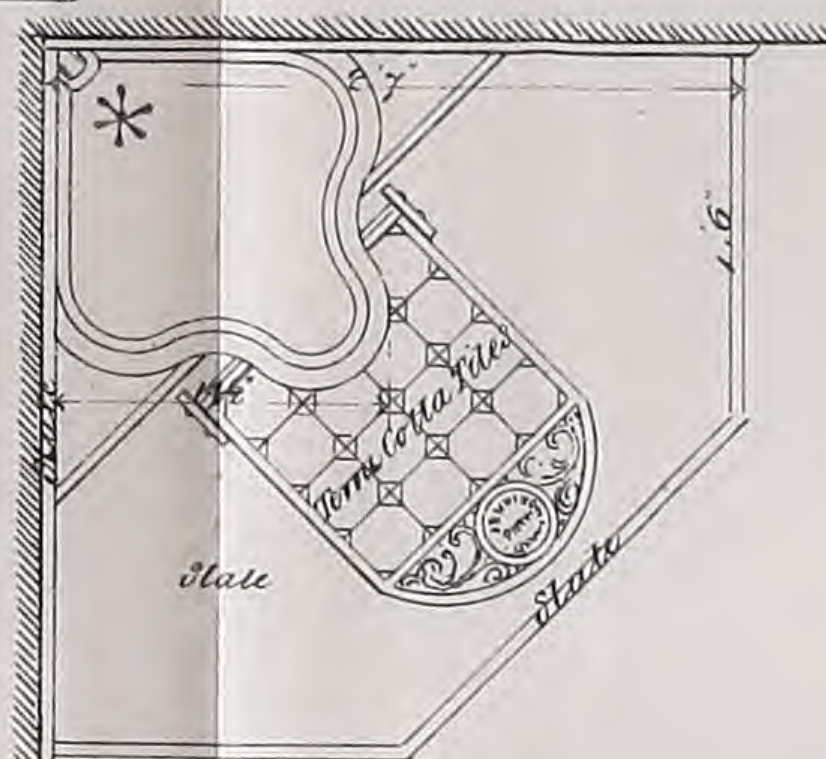
PLAN OF SLOP SINK



BATH / Rufford and Finch /

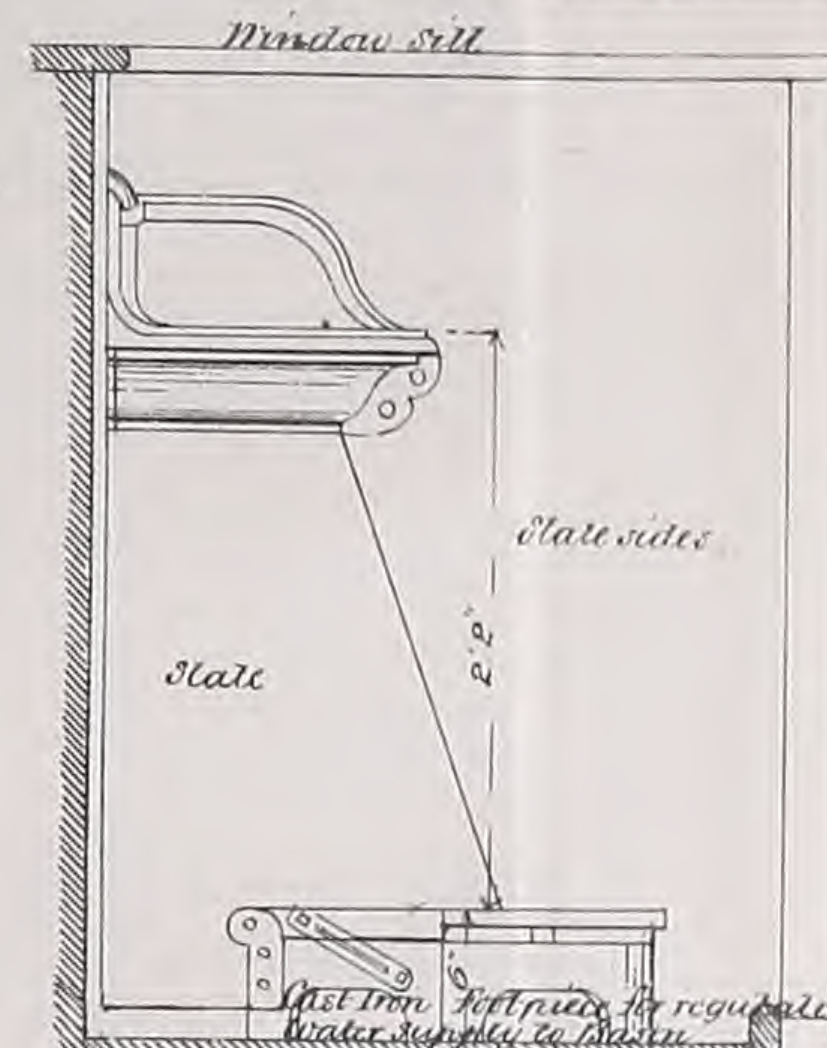


FORMS OF URINALS FOR WARD LAVATORIES

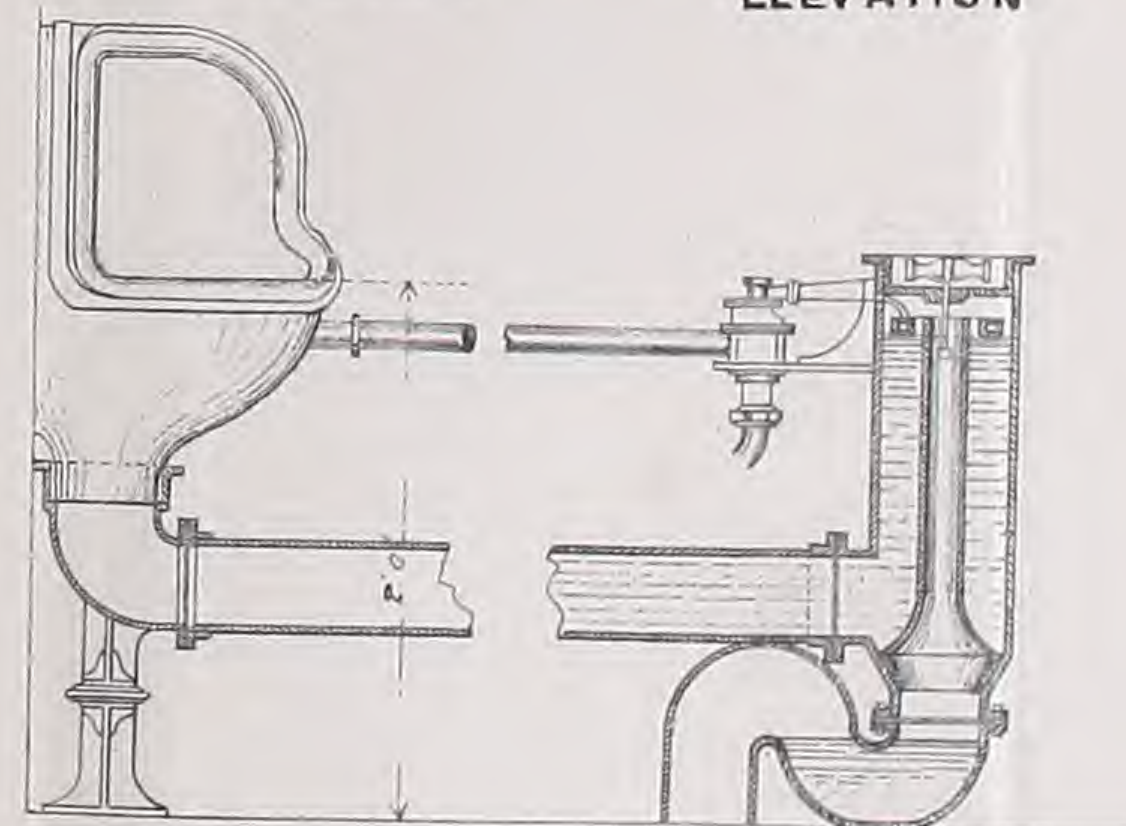


PLAN

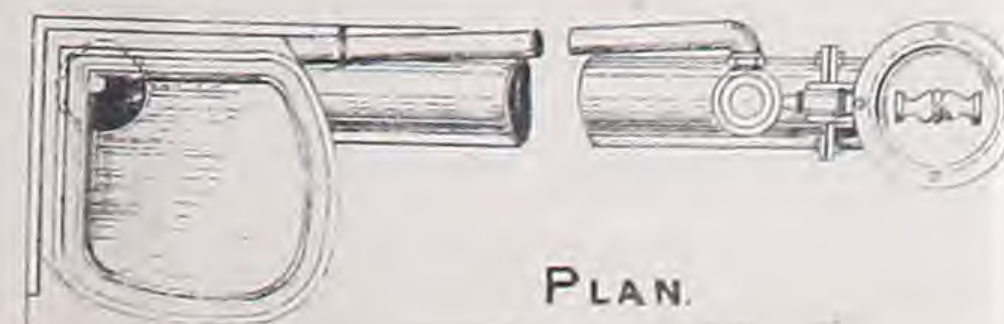
Inch Scale



ELEVATION



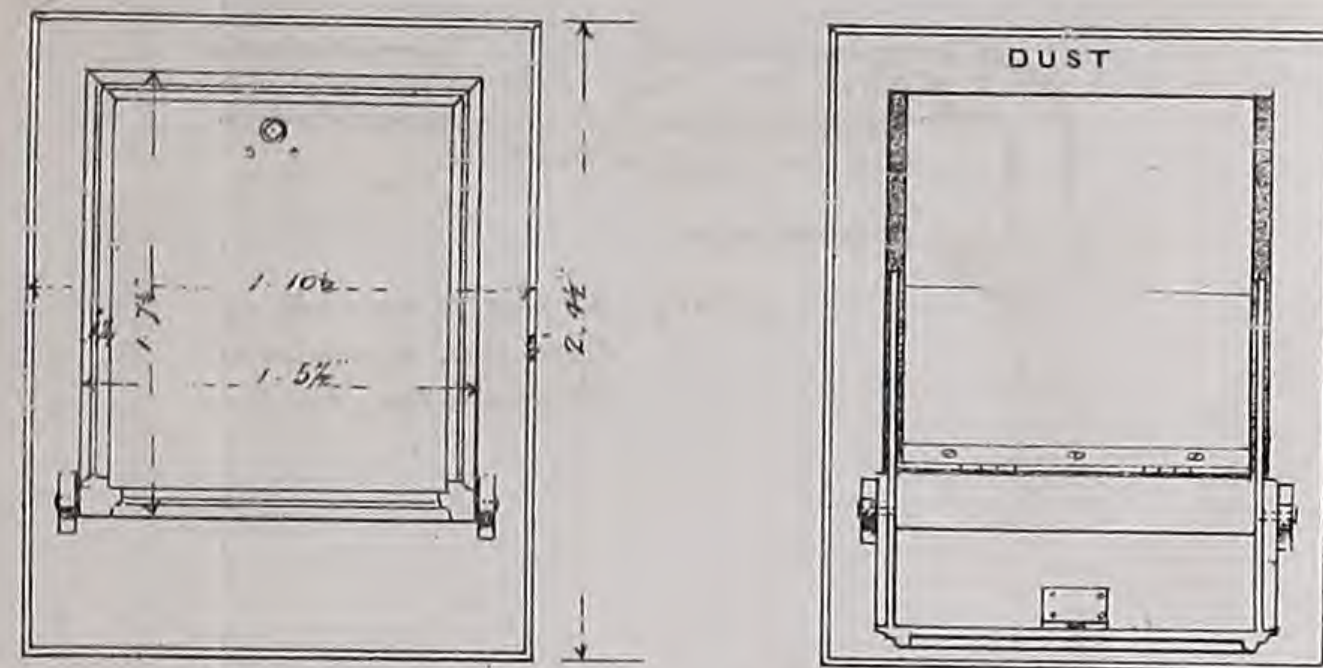
FRONT VIEW / Inch scale



PLAN.

HERBERT HOSPITAL WOOLWICH

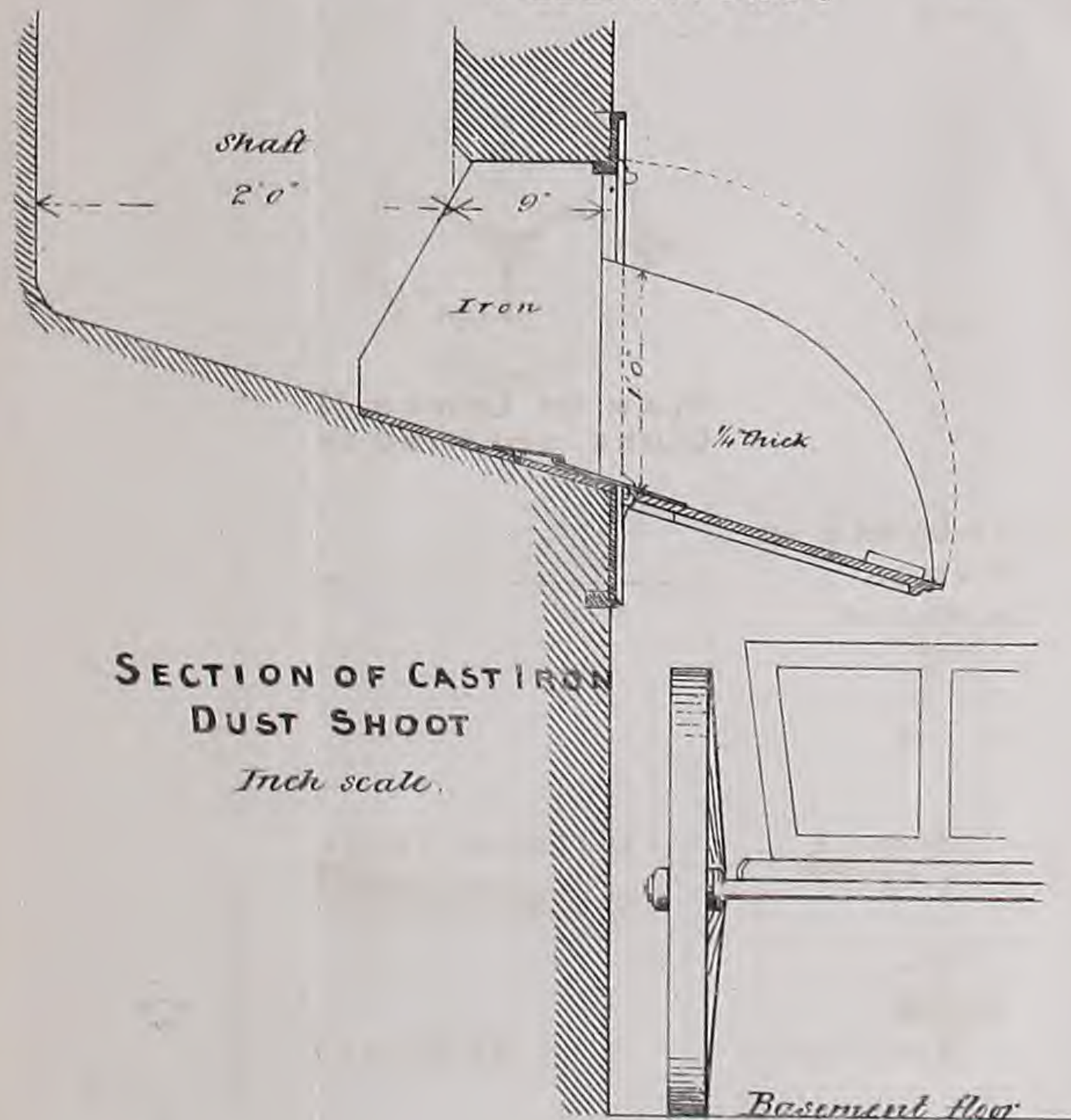
©Mistle



Closed

ELEVATIONS

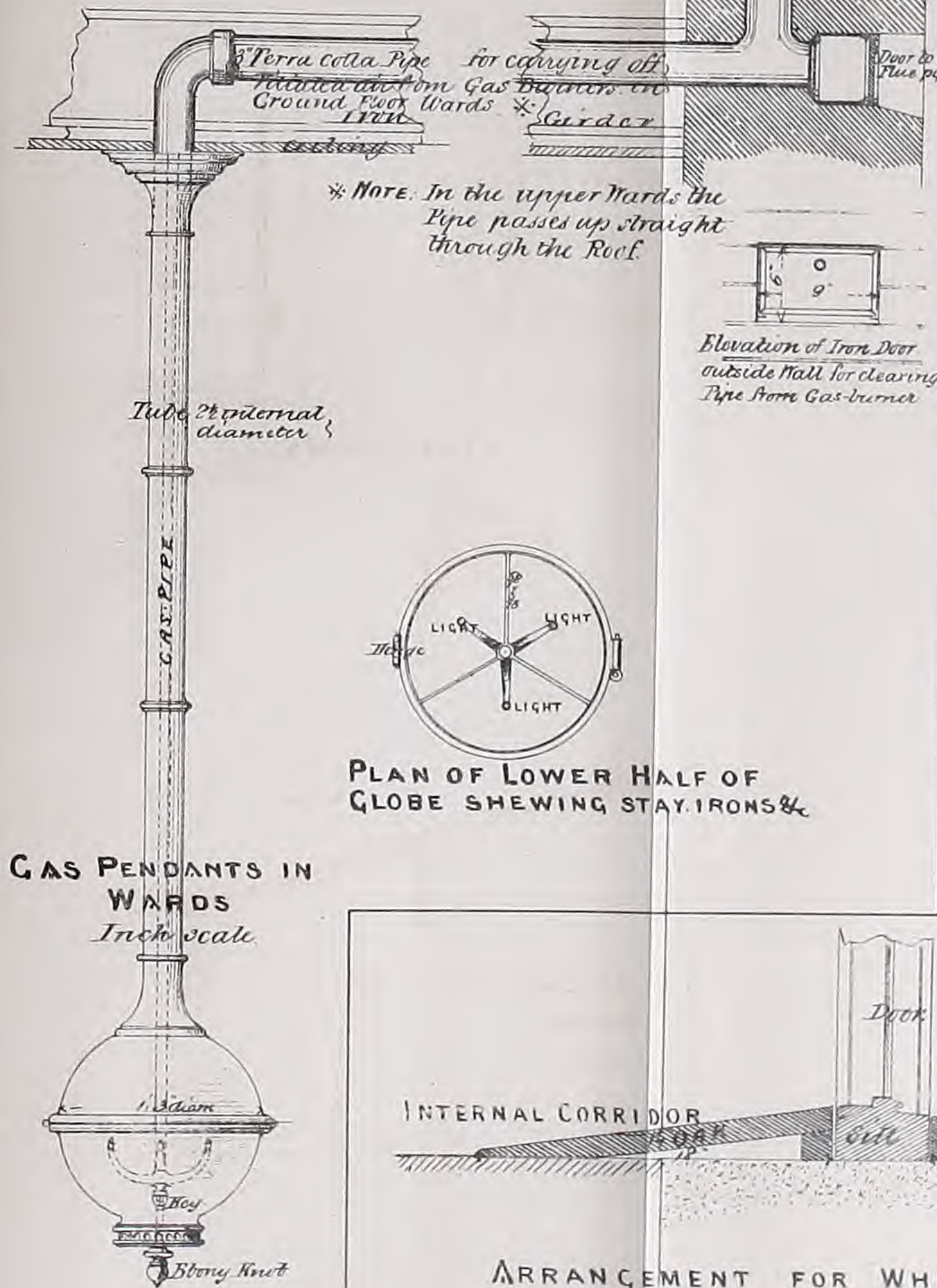
Open



SECTION OF CAST IRON DUST SHOOT

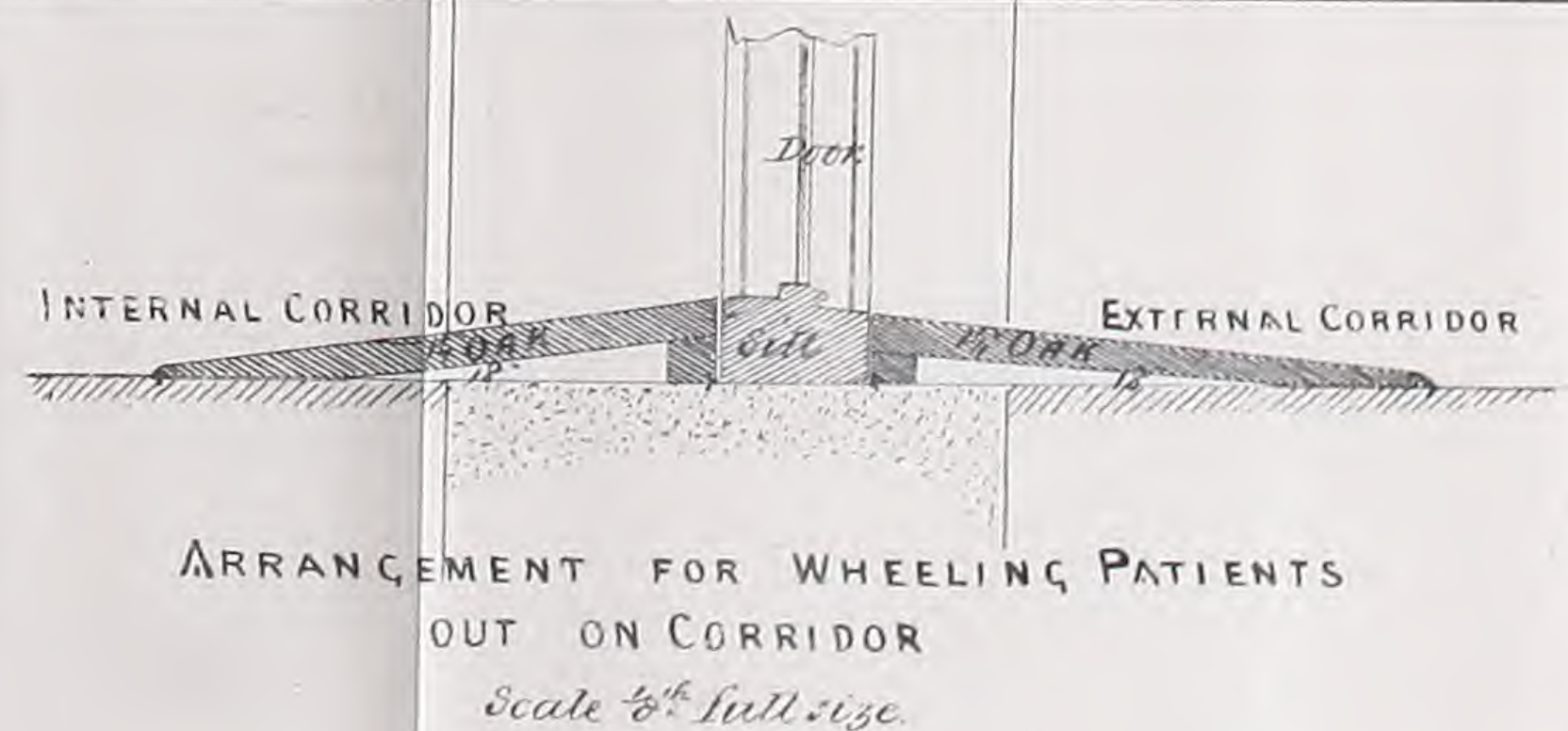
Inch scale

Basement floor



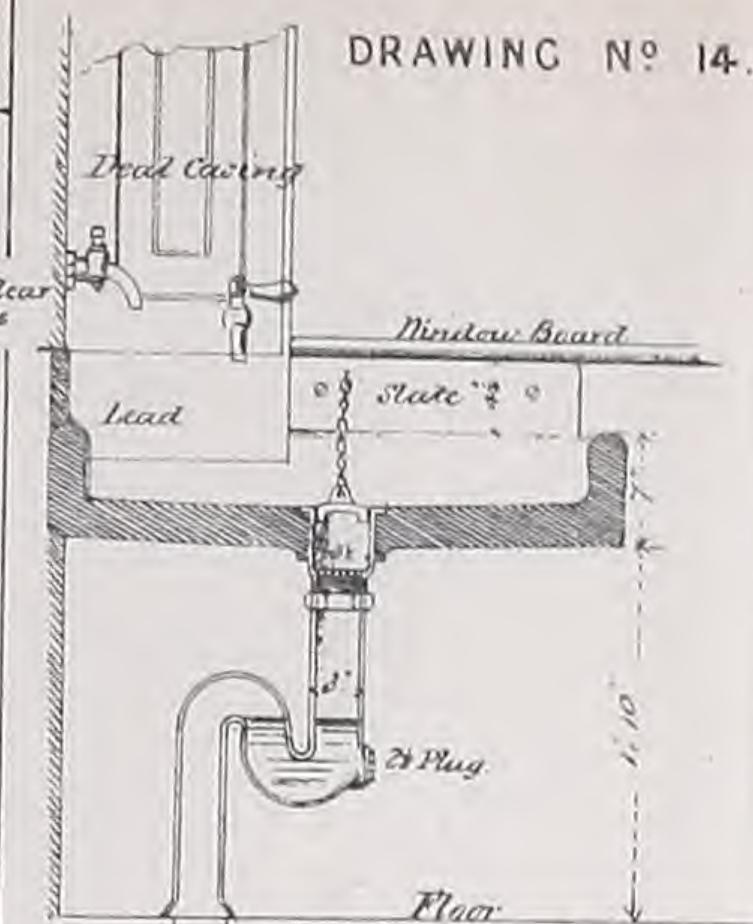
GAS PENDANTS IN WARDS
Inch scale

PLAN OF LOWER HALF OF GLOBE SHEWING STAY IRONS &c

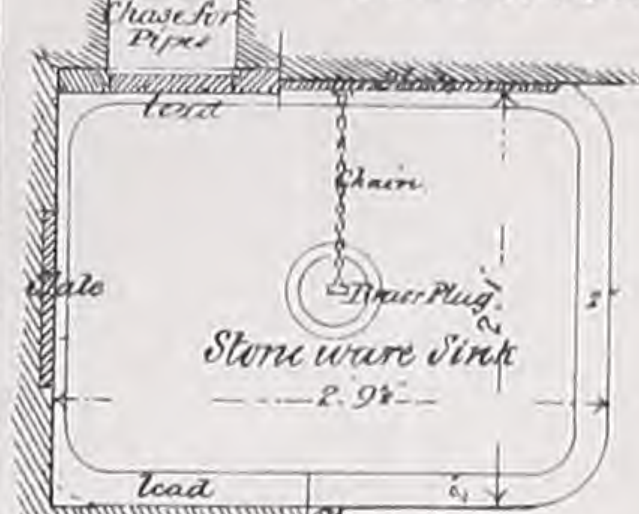


ARRANGEMENT FOR WHEELING PATIENTS OUT ON CORRIDOR
Scale 1/8" full size

DRAWING NO 14.



ELEVATION



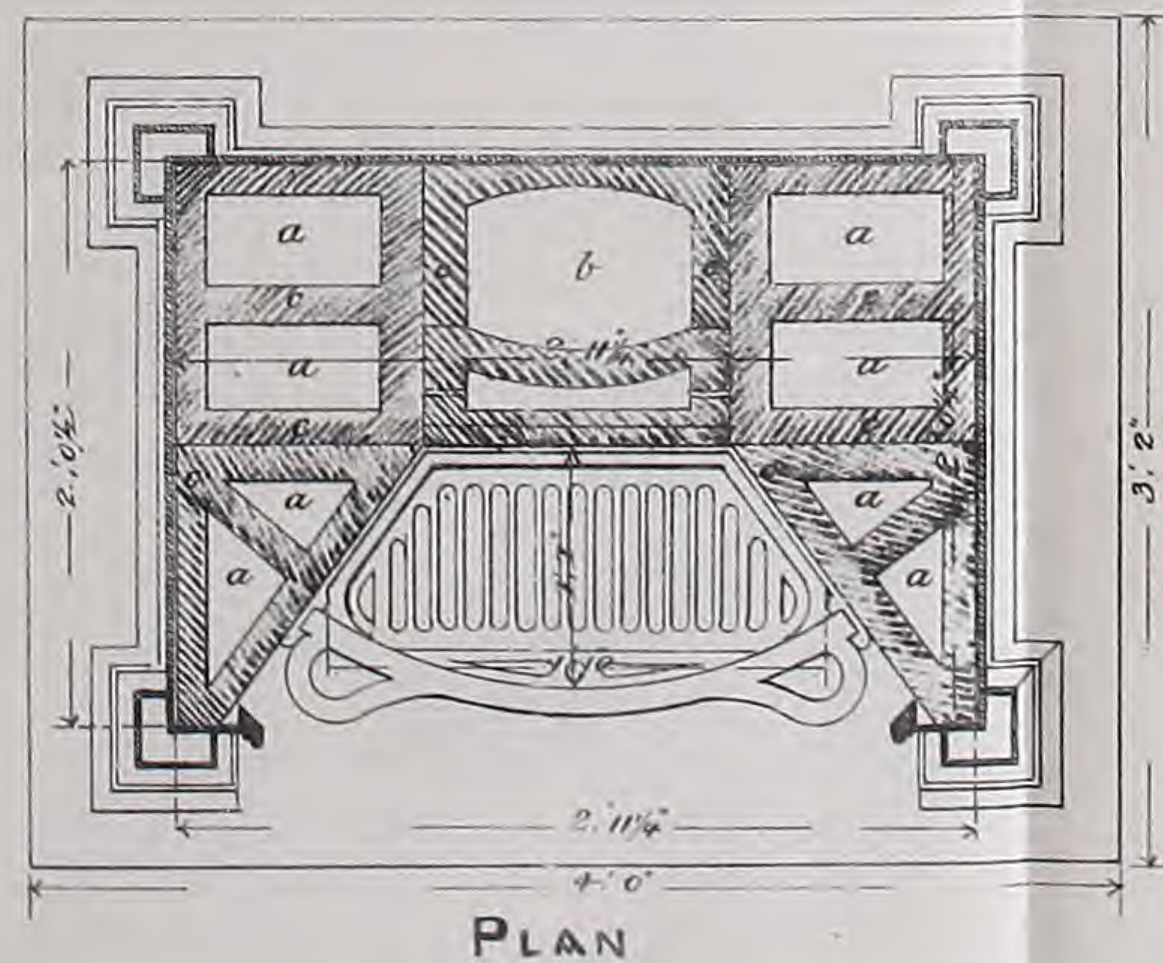
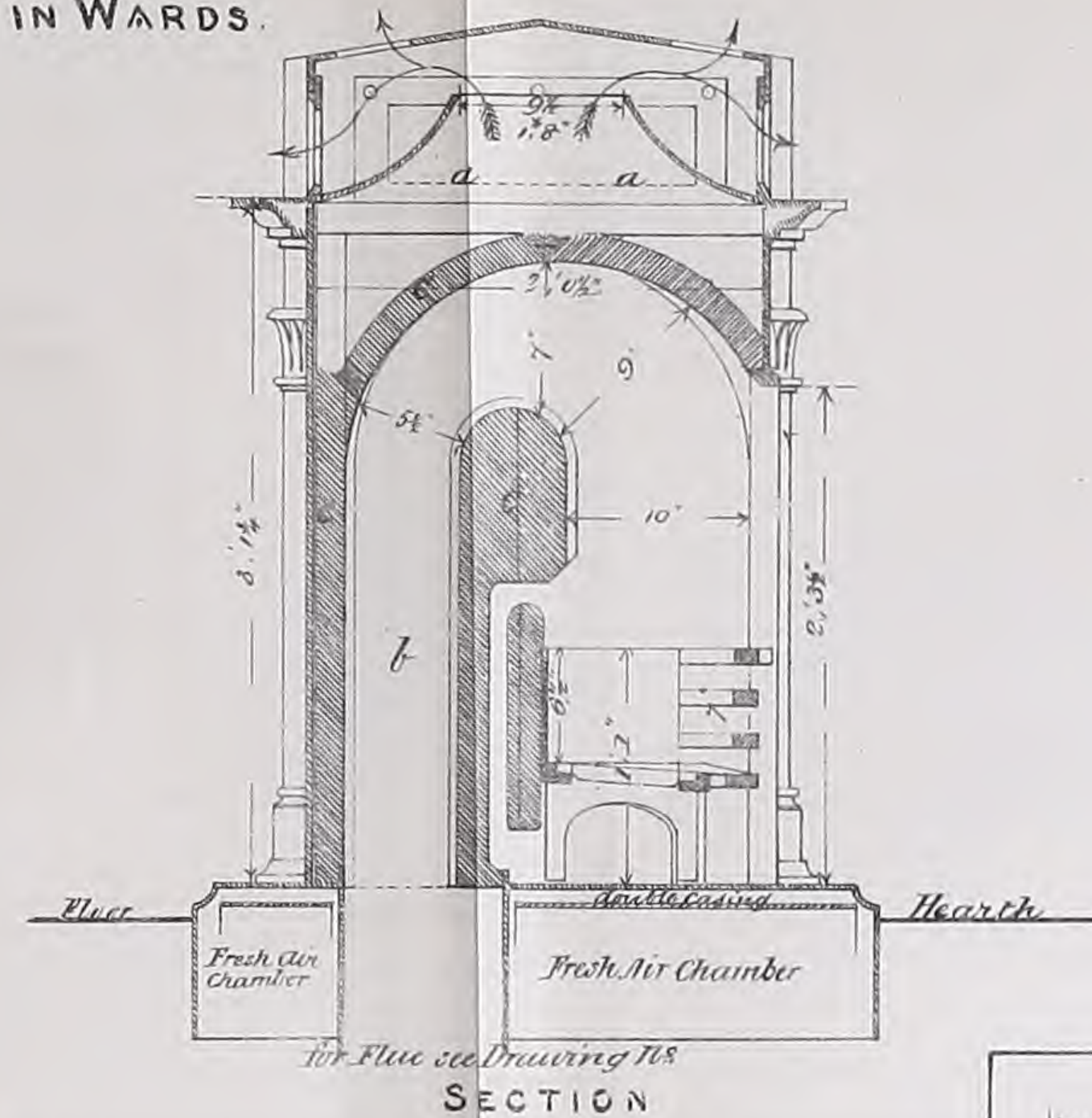
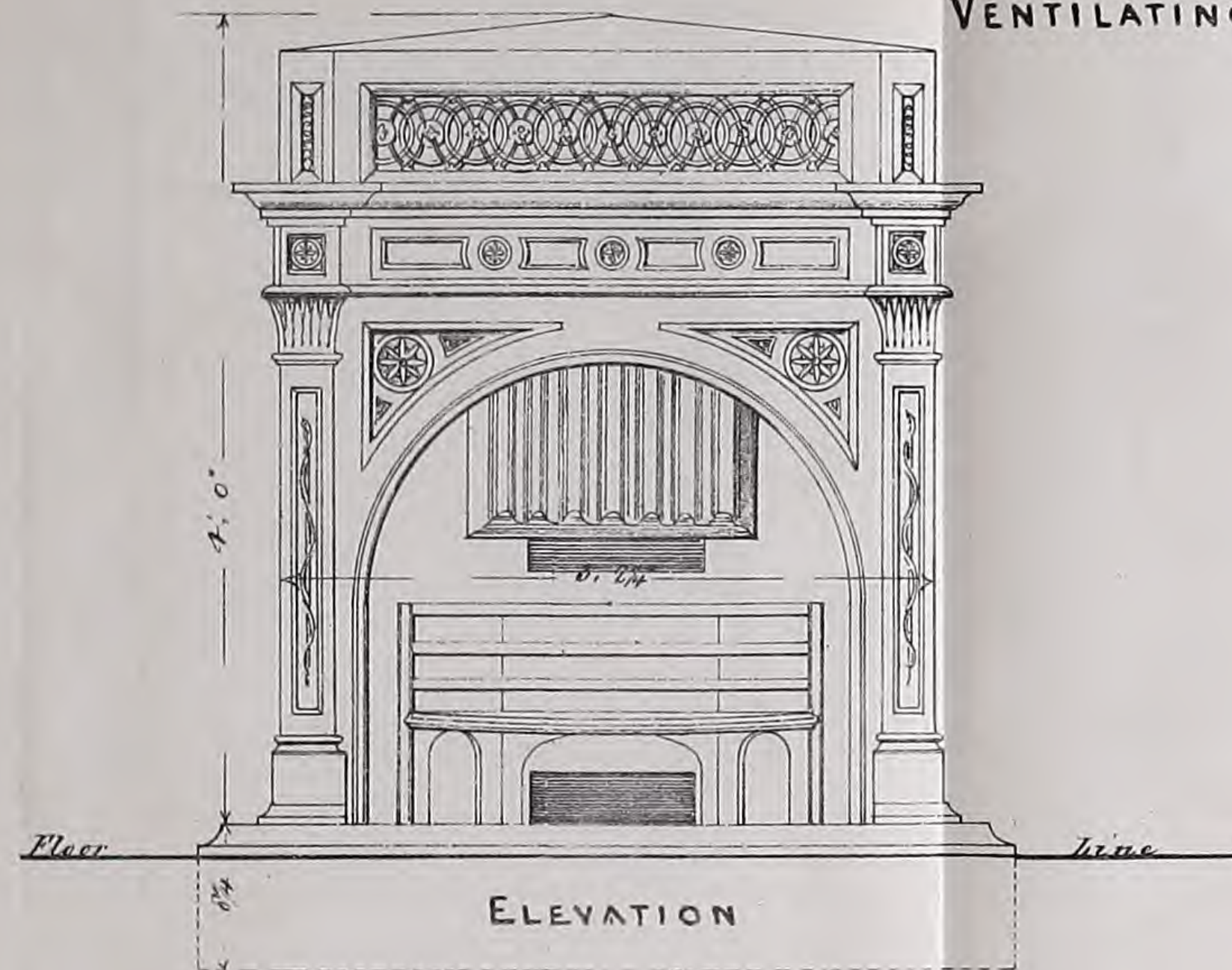
PLAN

SINK FOR WARD SCULLERIES
Scale 1/4" to one foot

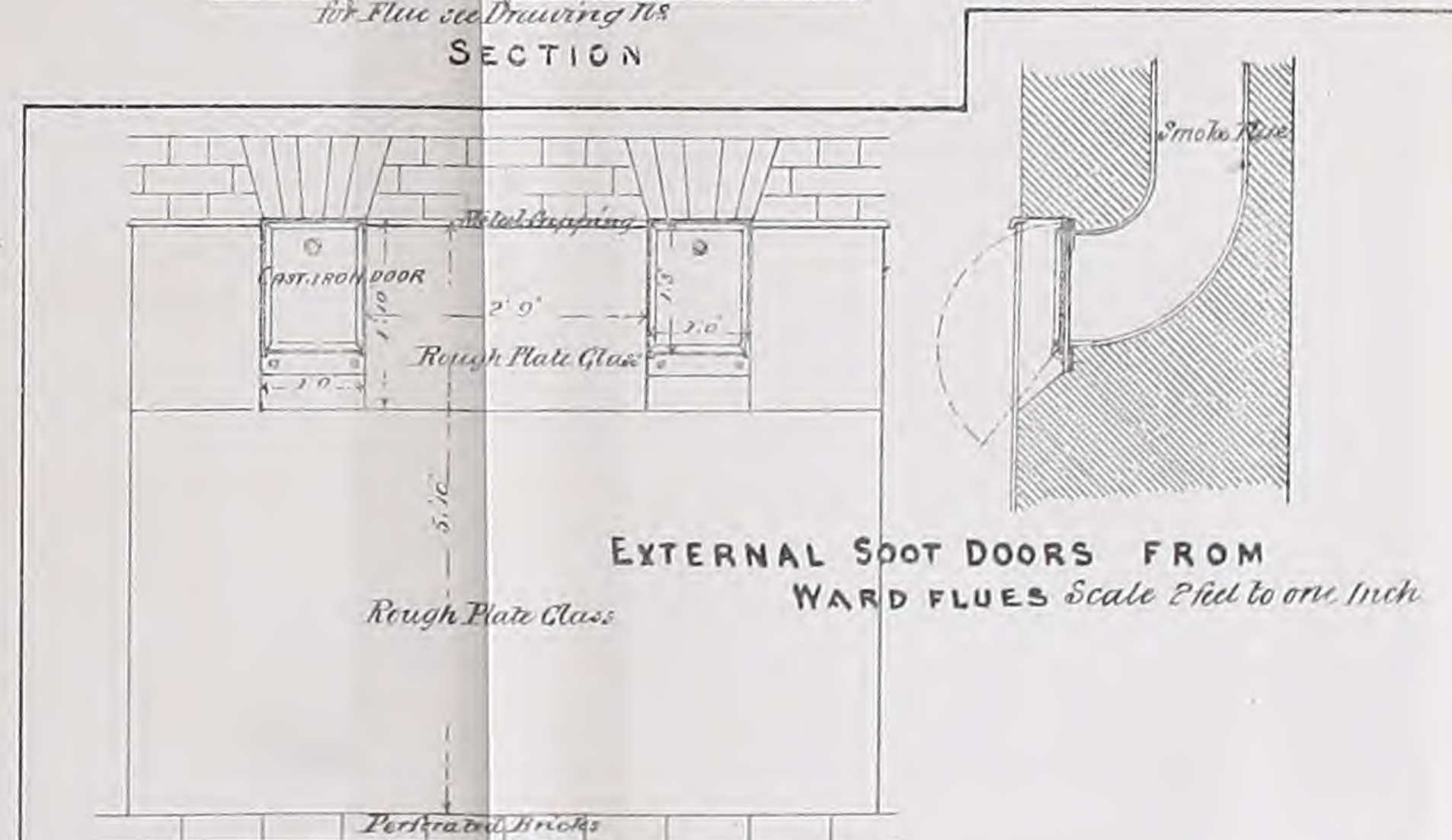
HERBERT HOSPITAL WOOLWICH

VENTILATING STOVE IN WARDS.

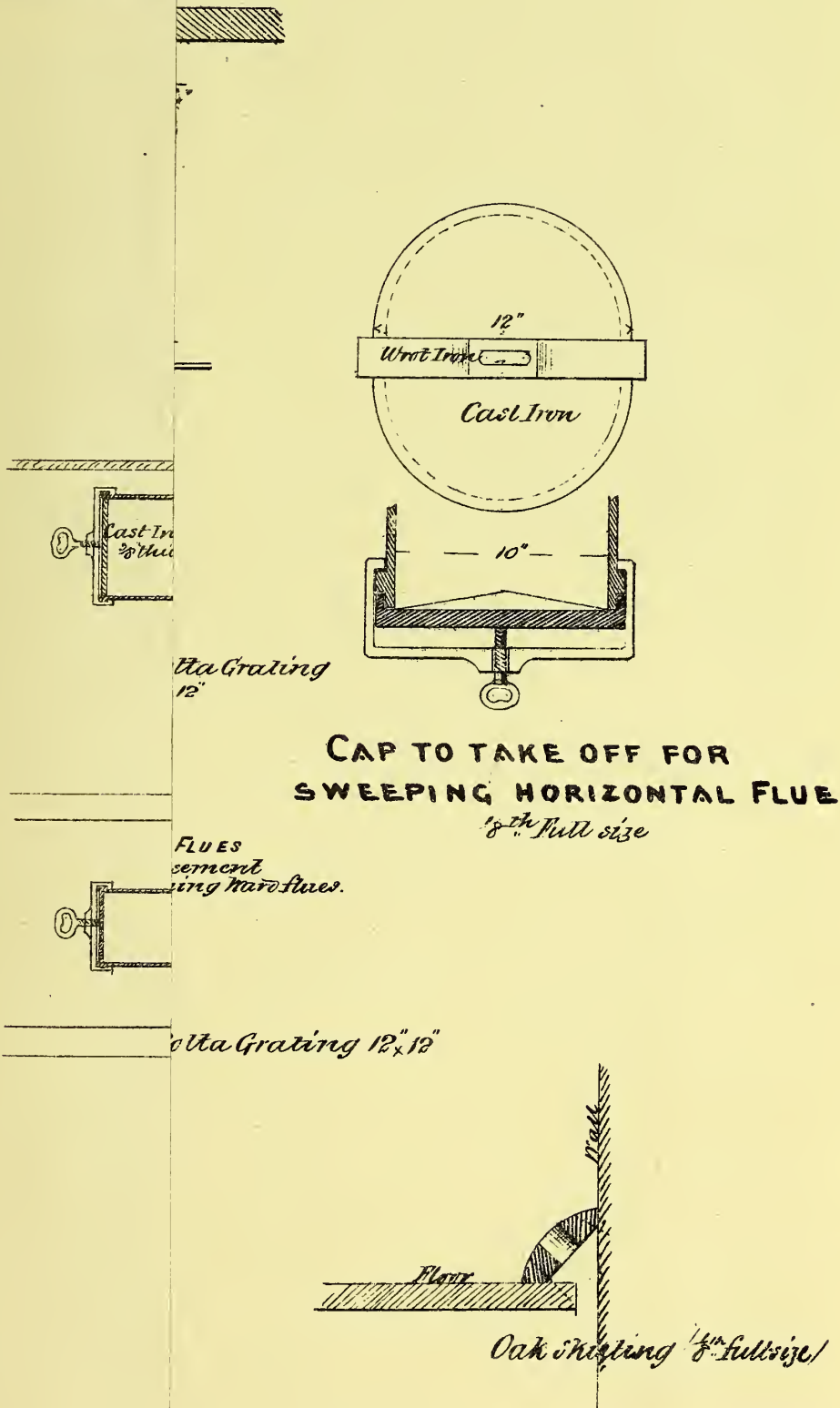
DRAWING No 15



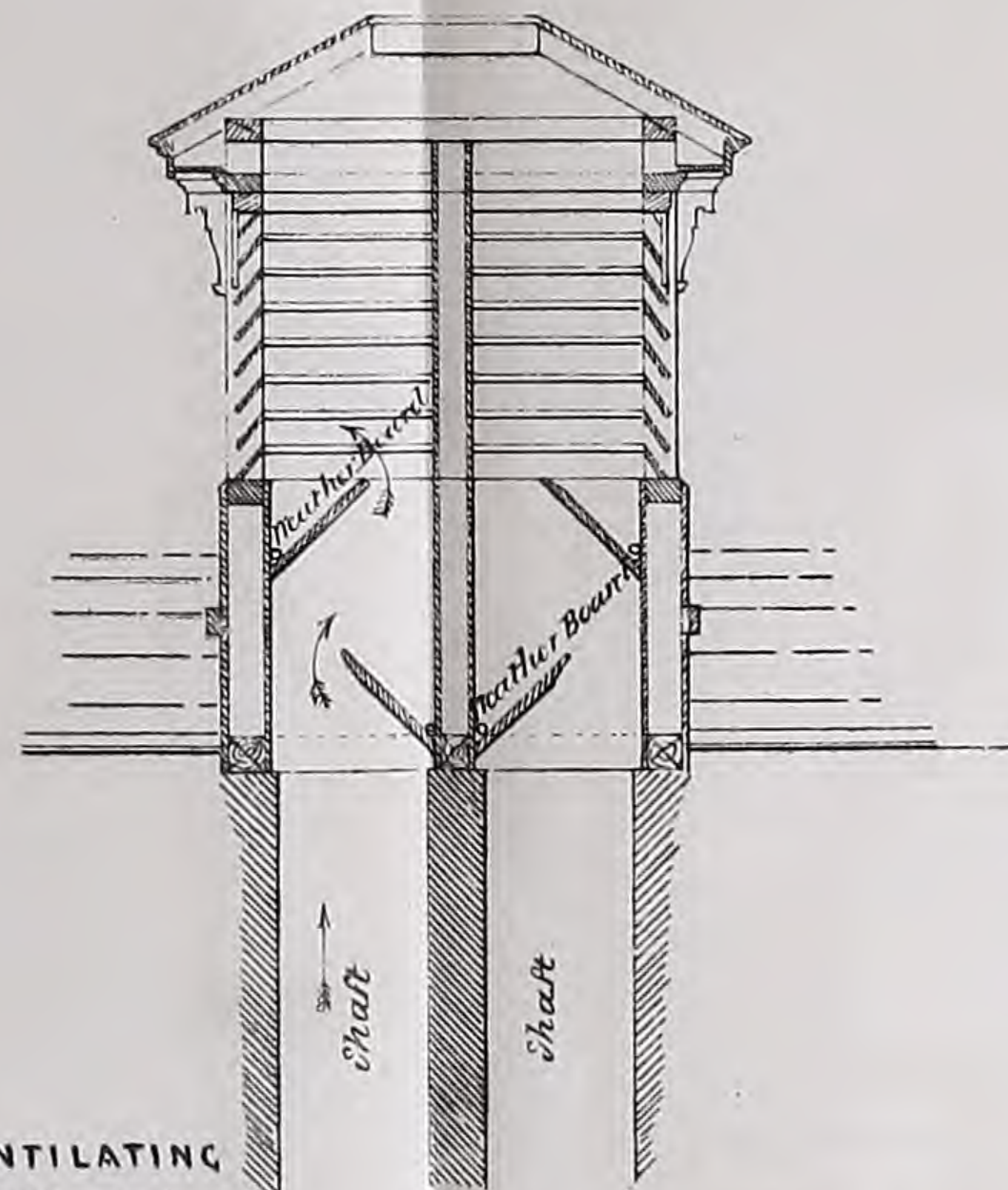
a a. Fresh Air Flues.
b. Smoke Flue.
c c. Fire Clay.



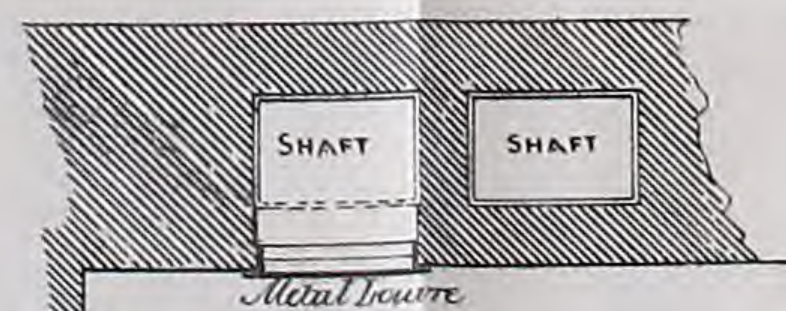
HERBERT
FLUES FROM V



DRAWING N^o 17.



Scale 2 feet to one inch.



The image contains two architectural drawings of ventilating shafts from lavatories.

The top drawing is an **ELEVATION**. It shows a vertical section of a wall with a **Stone Parapet** at the top. Below the parapet is a **State Louvre**. The wall is labeled **Lead Flat**. A **Floor for Cisterns** is shown below the wall. The shaft is labeled **Shaft from Upper Lavatories**. The drawing is labeled **ELEVATION**.

The bottom drawing is a **PLAN IN PARAPET**. It shows a cross-section of the parapet. The shaft is labeled **SHAFT**. The width of the shaft is indicated as **2' 6"**. The drawing is labeled **PLAN IN PARAPET**.

Between the two drawings is the title **VENTILATING SHAFTS FROM LAVATORIES** and the scale **Scale 2 feet to one inch**.

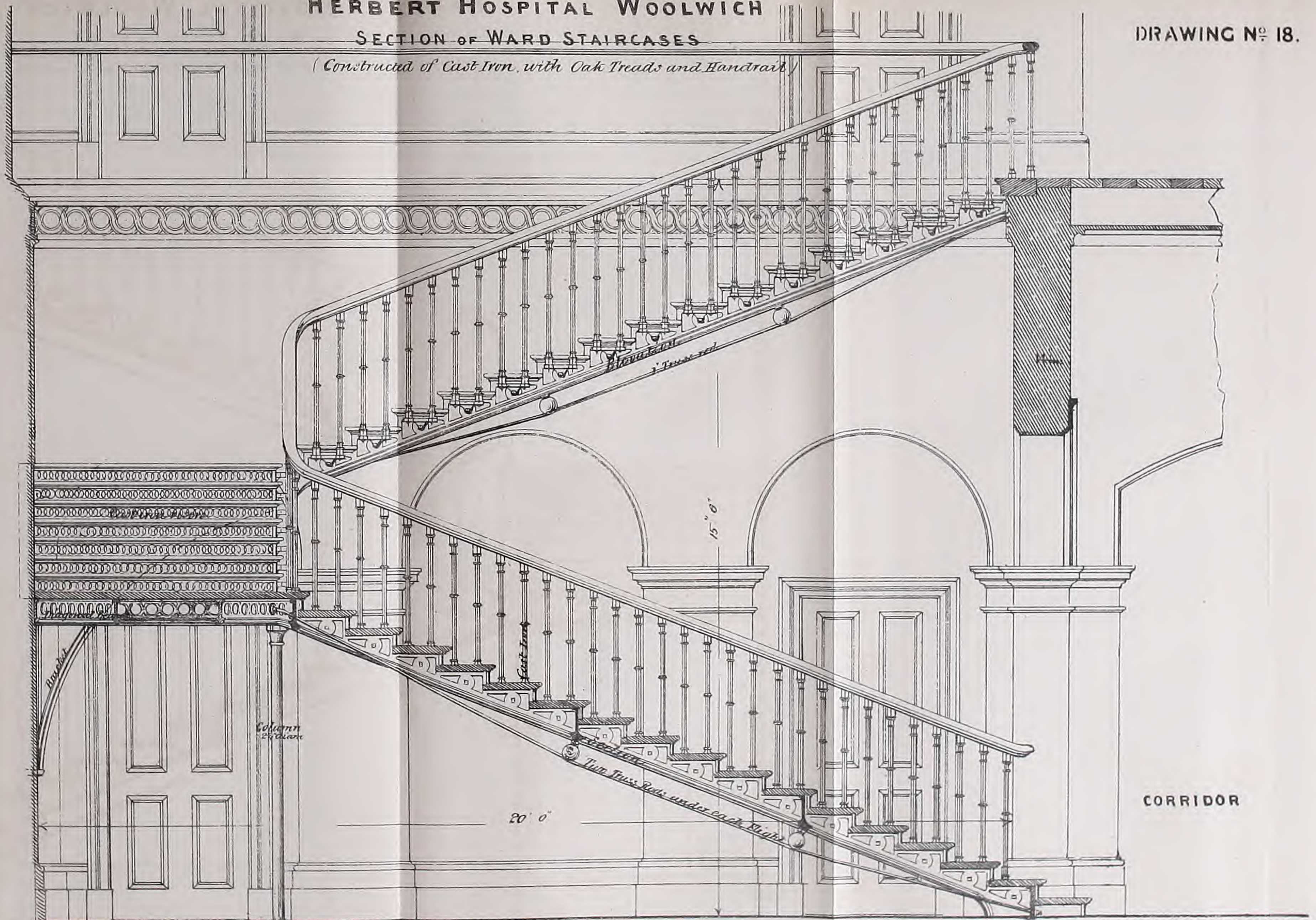
PLAN IN PARAPET

HERBERT HOSPITAL WOOLWICH

SECTION OF WARD STAIRCASES

(Constructed of Cast Iron, with Oak Treads and Handrail)

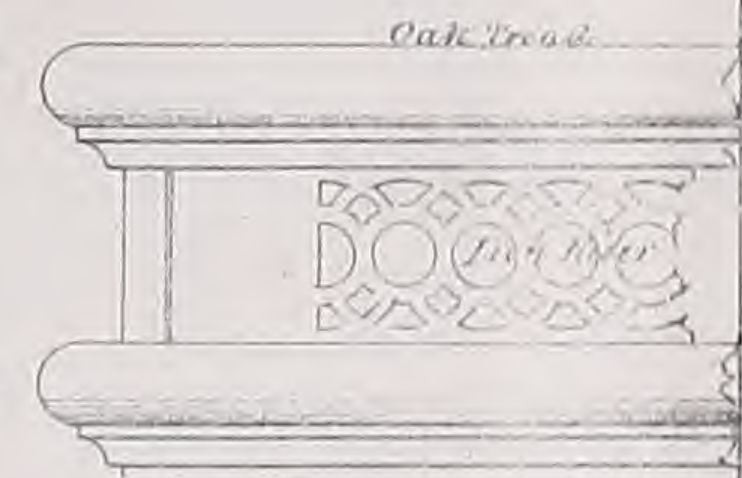
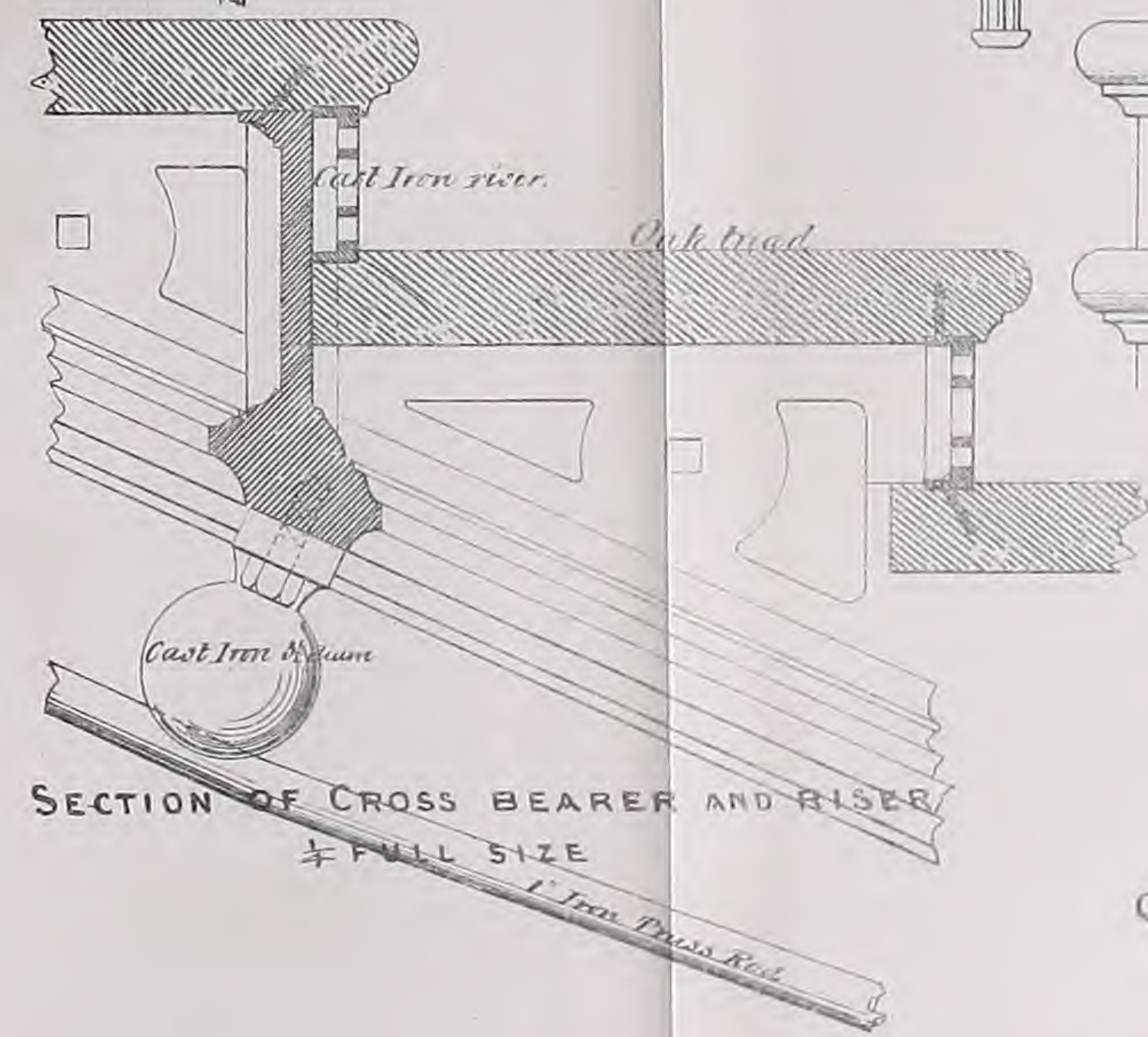
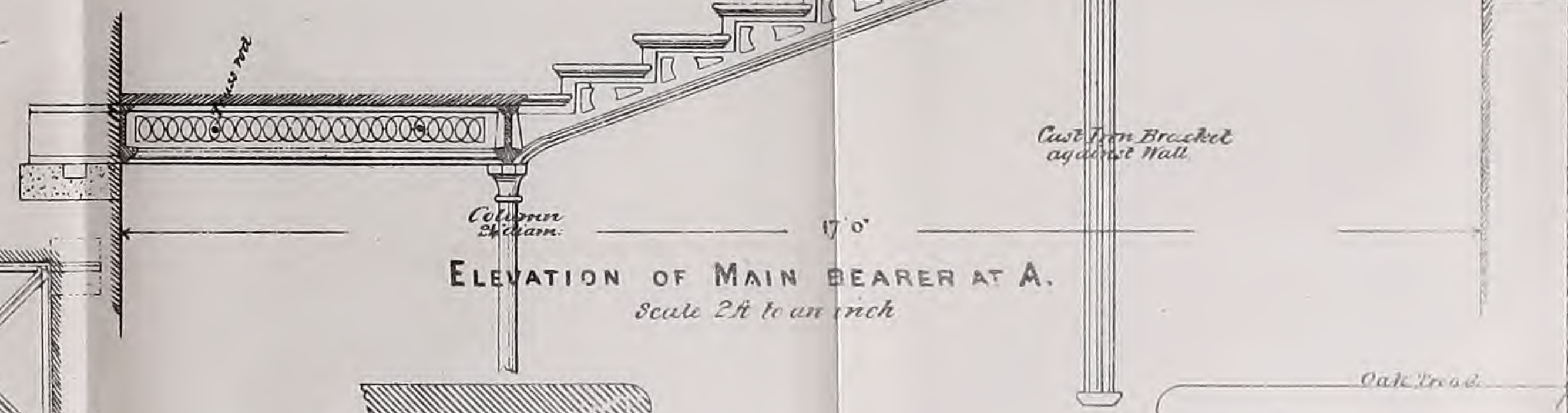
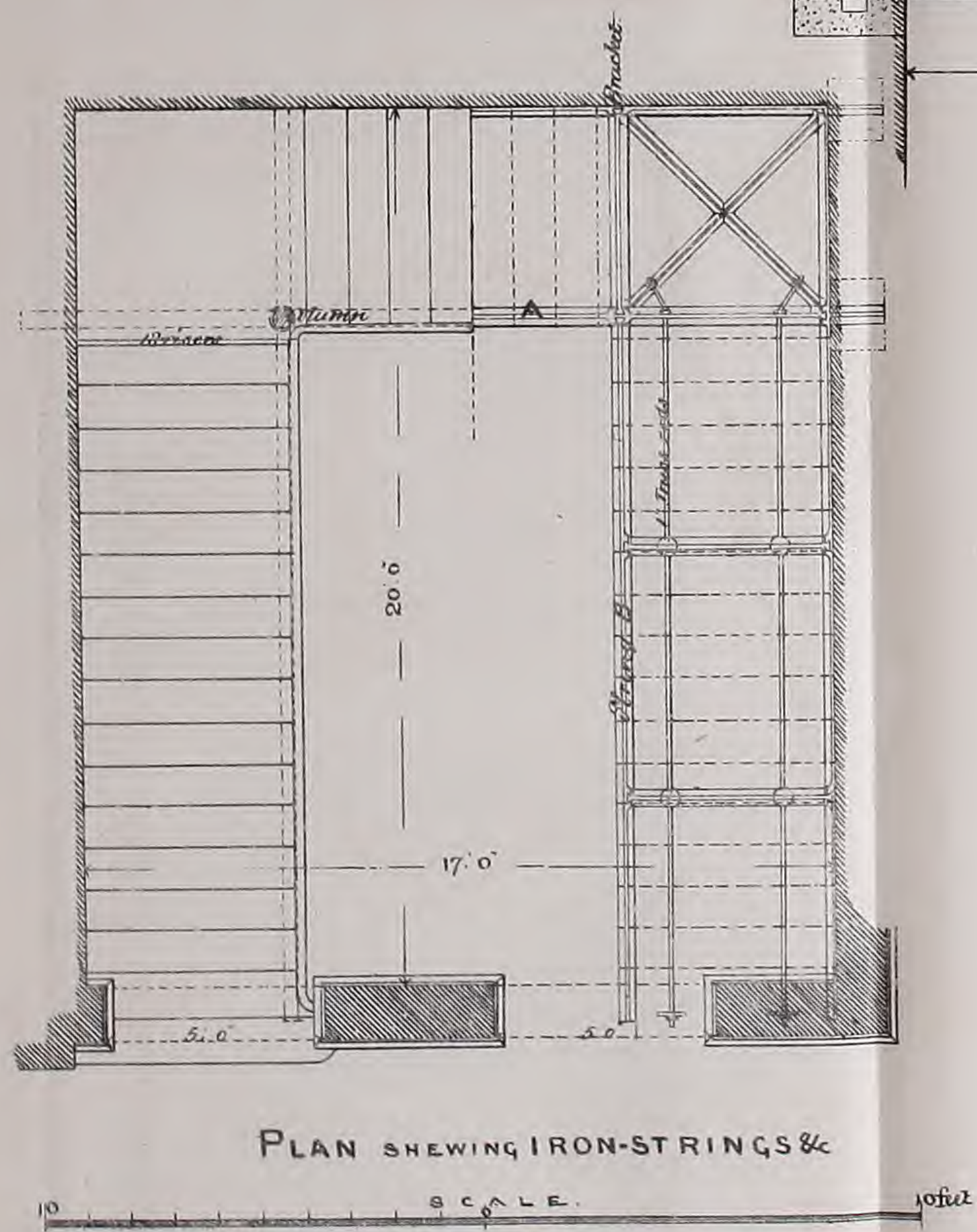
DRAWING N^o 18.



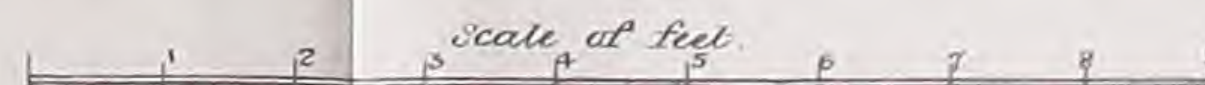
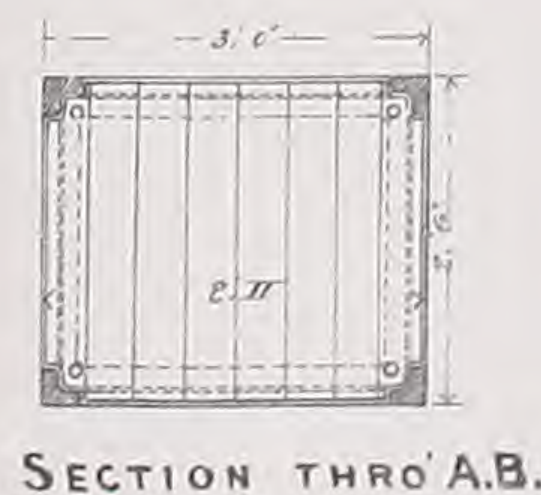
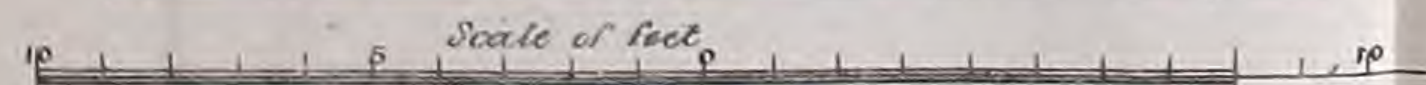
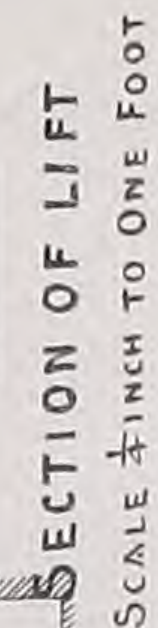
SCALE 2 FEET TO ONE INCH

HERBERT HOSPITAL WOOLWICH

DETAILS OF WARD STAIRCASES



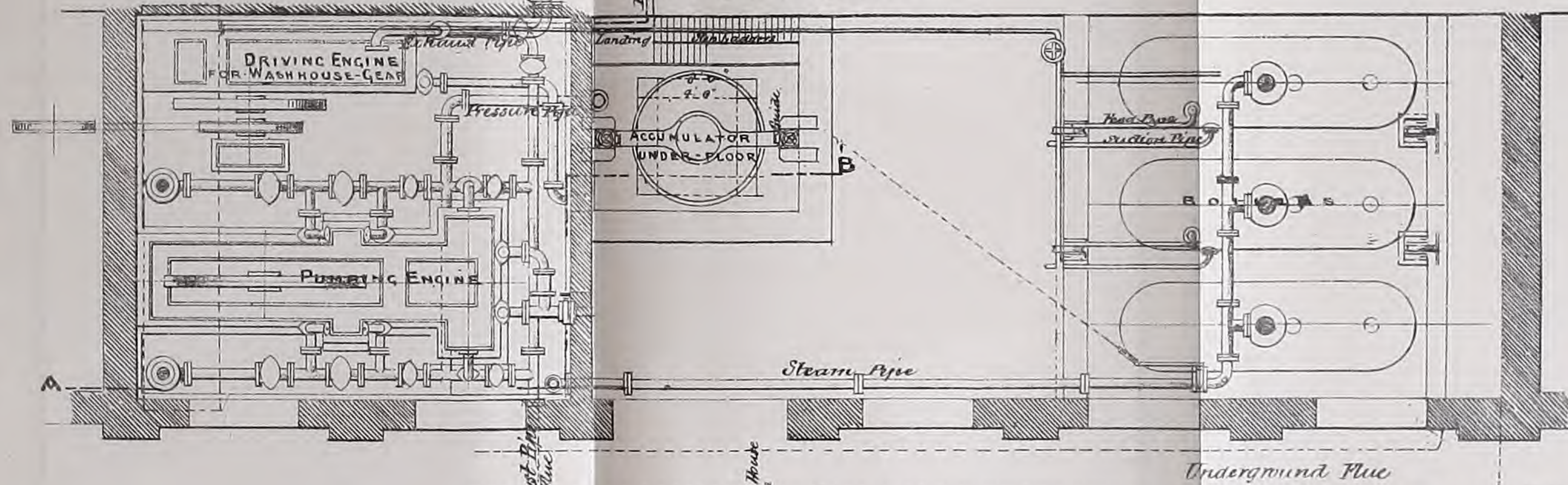
DRAWING, N^o. 20.



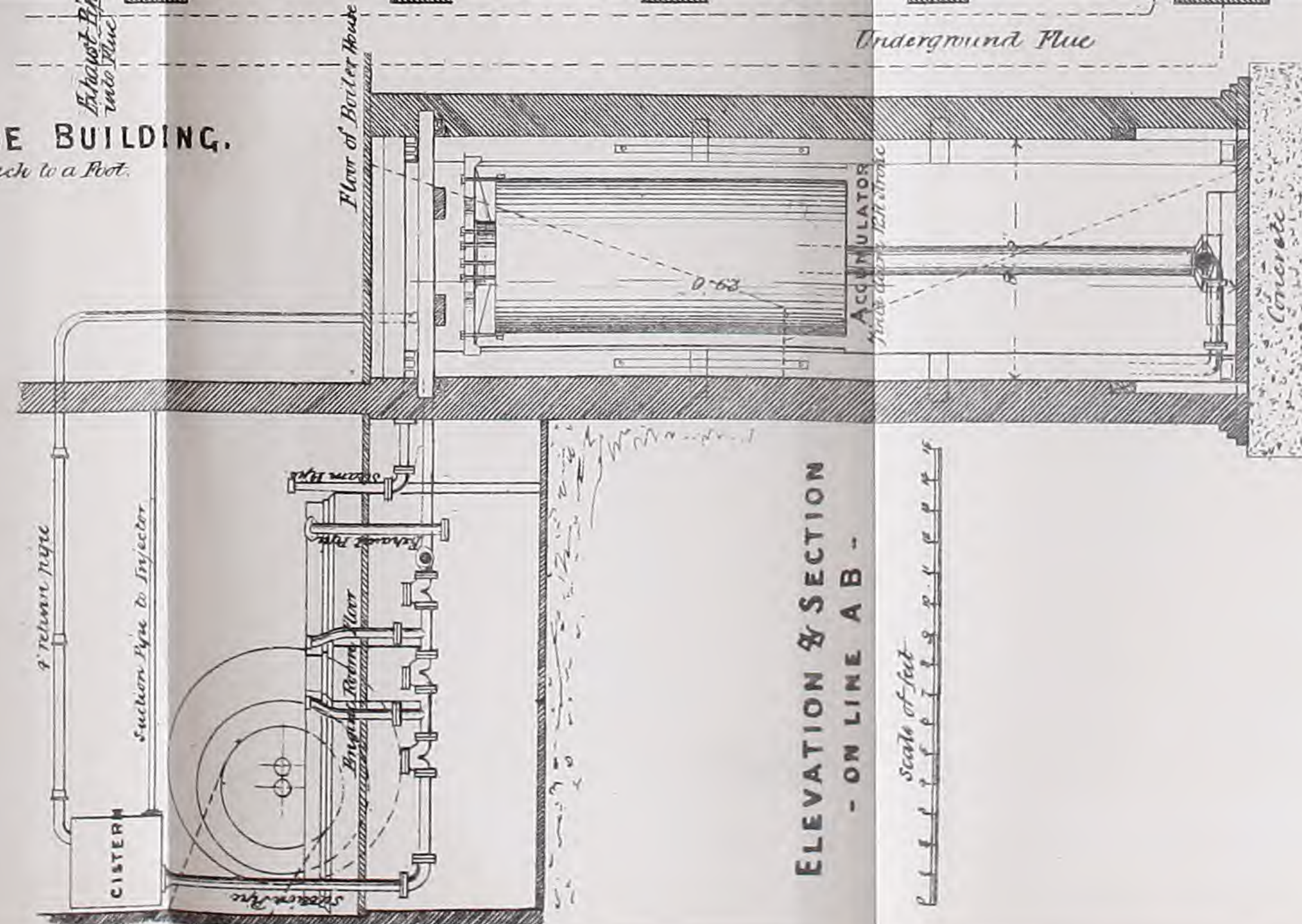
HERBERT HOSPITAL WOOLWICH

BOILERS & ENGINES WITH ACCUMULATOR, FOR HYDRAULIC-LIFTS

DRAWING N^o 21



PLAN IN WASHHOUSE BUILDING.
Scale $\frac{1}{8}$ of an inch to a foot.



ELEVATION & SECTION
- ON LINE A B -

VENTILATING GRATE FOR OFFICES, OFFICERS' QUARTERS, NURSES ROOMS, AND ORDERLIES ROOMS.

Fig. 1.
ELEVATION

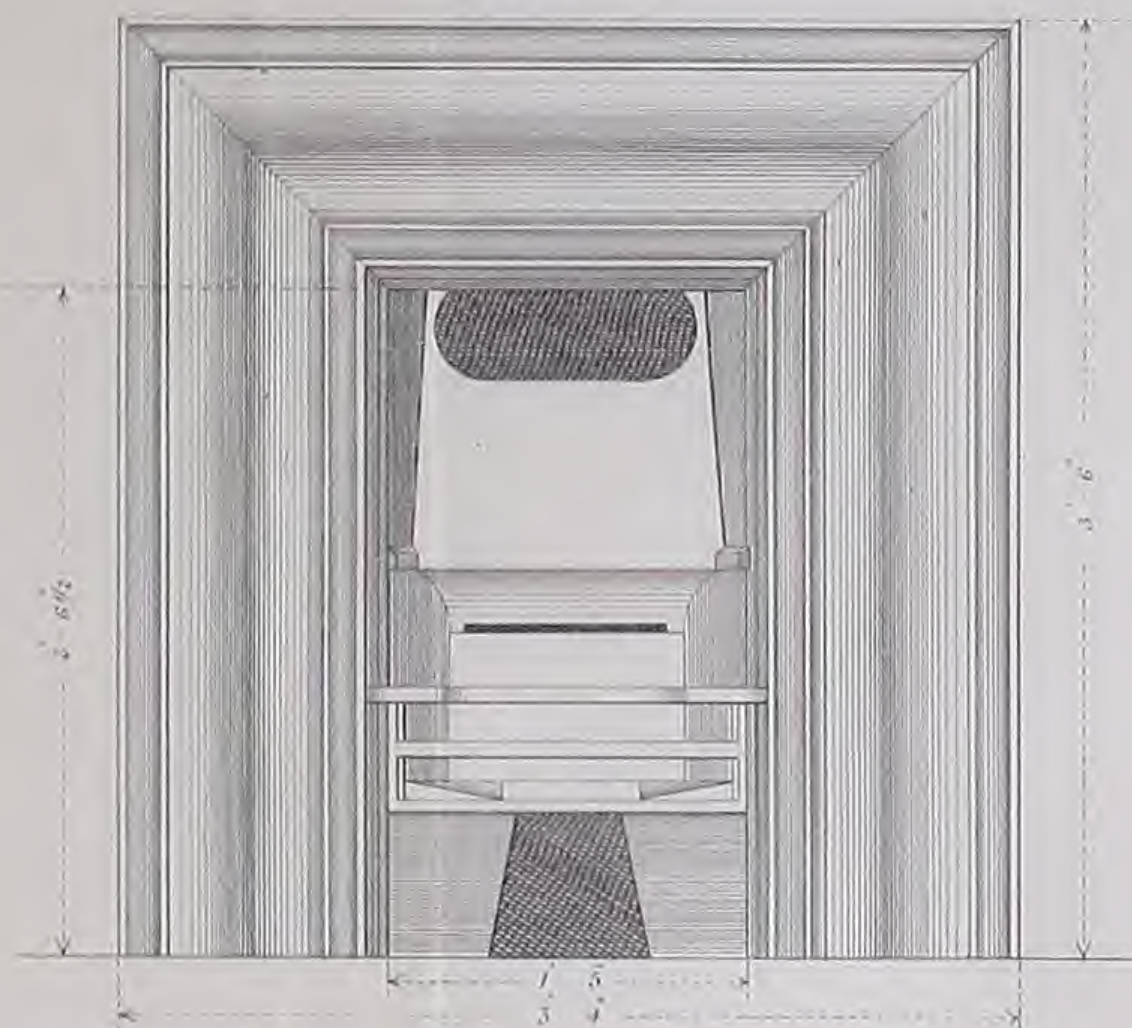
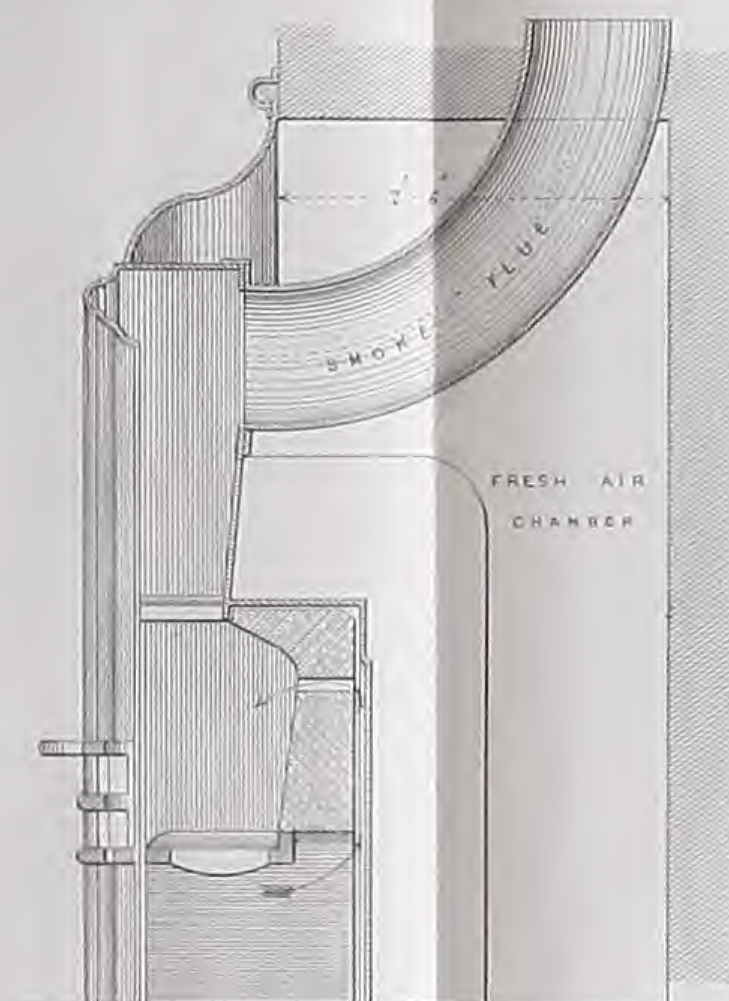


Fig. 2.

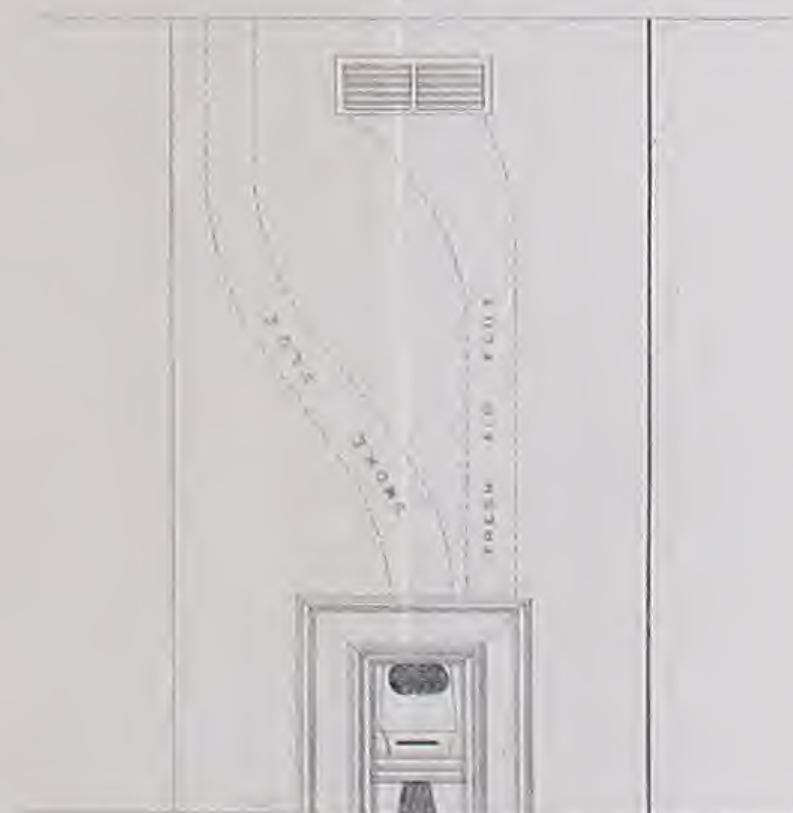


Width of Fire Opening 1'-3"				Size of Stoves 3'-2" x 3'-6"			
D ^o	D ^o	D ^o	1'-5"	D ^o	"	D ^o	3'-4" x 3'-6"
D ^o	D ^o	D ^o	1'-9"	D ^o	"	D ^o	3'-8" x 5'-6"

S C A L E

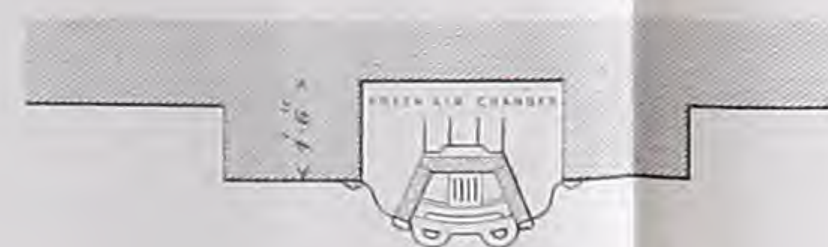


Fig. 3.



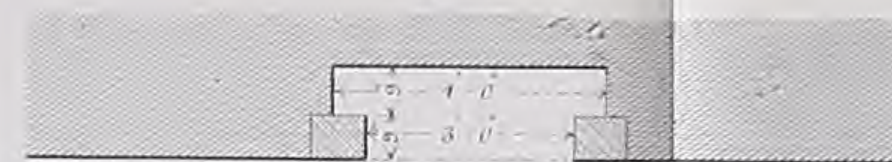
ELEVATION OF CHIMNEY AND STOVE
SHewing THE FLUES

Fig. 4.



PLAN OF STOVE & AIR CHAMBER

Fig. 5.



PLAN SHewing THE METHOD OF FORMING THE AIR CHAMBER IN AN EXISTING 4 FEET FIRE PLACE.

Fig. 6.



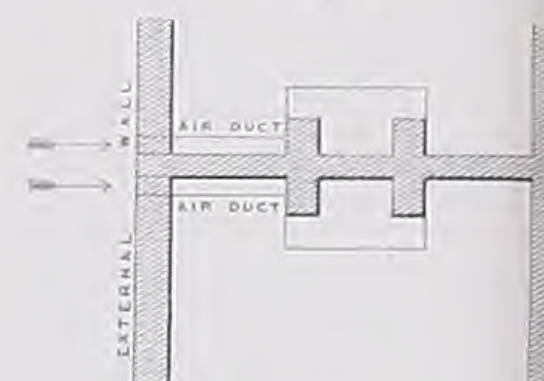
PLAN OF COVERING STONE FOR AIR CHAMBER

Fig. 7.



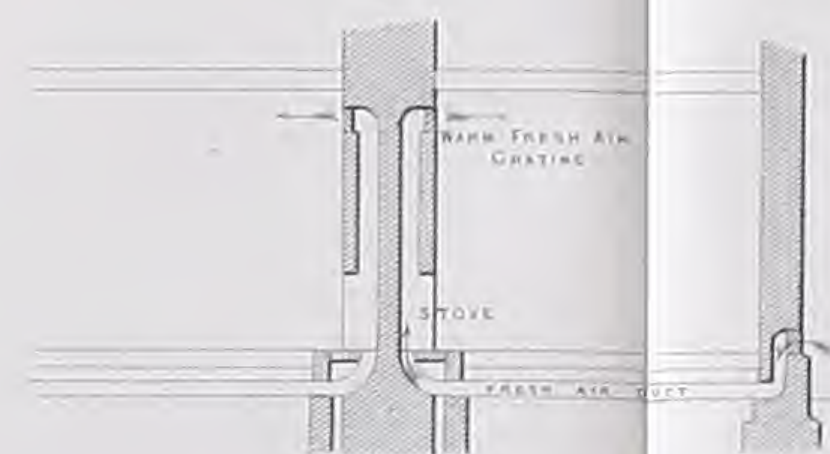
PLAN OF A CHIMNEY
SHewing THE SMOKE & AIR FLUES

Fig. 8.



PLAN
SHewing AIR DUCT ON THE FLOOR

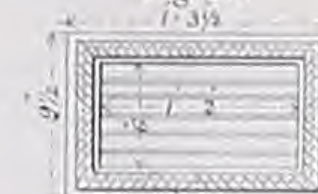
Fig. 9.



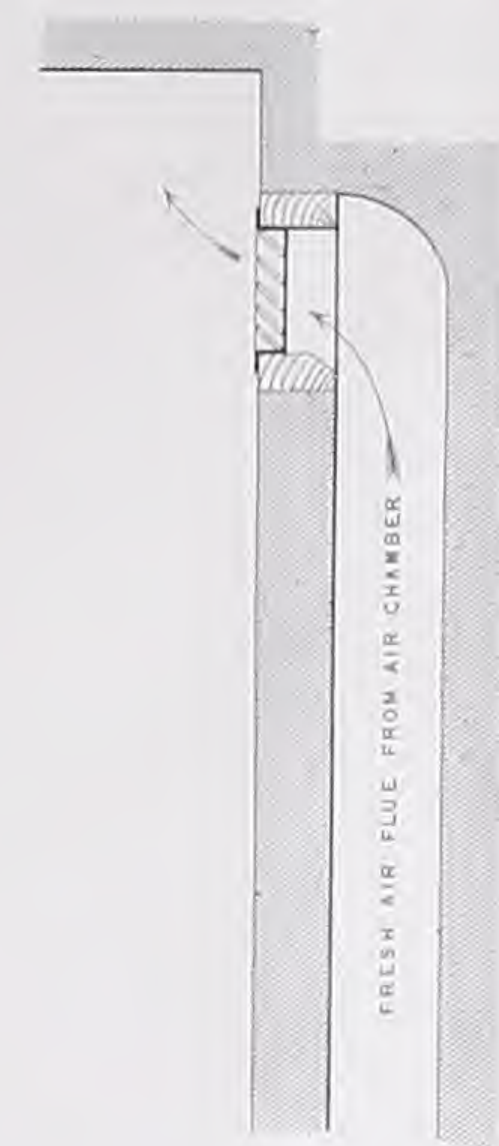
SECTION
SHewing AIR DUCT UNDER THE FLOOR

DRAWING N^o 22.

Fig. 10.



VENTILATOR FOR OFFICERS ROOMS.



ELEVATION & SECTION OF LOUVRED FRAME
LOUVRES N^o 14-B.W.C.

Fig. 11.

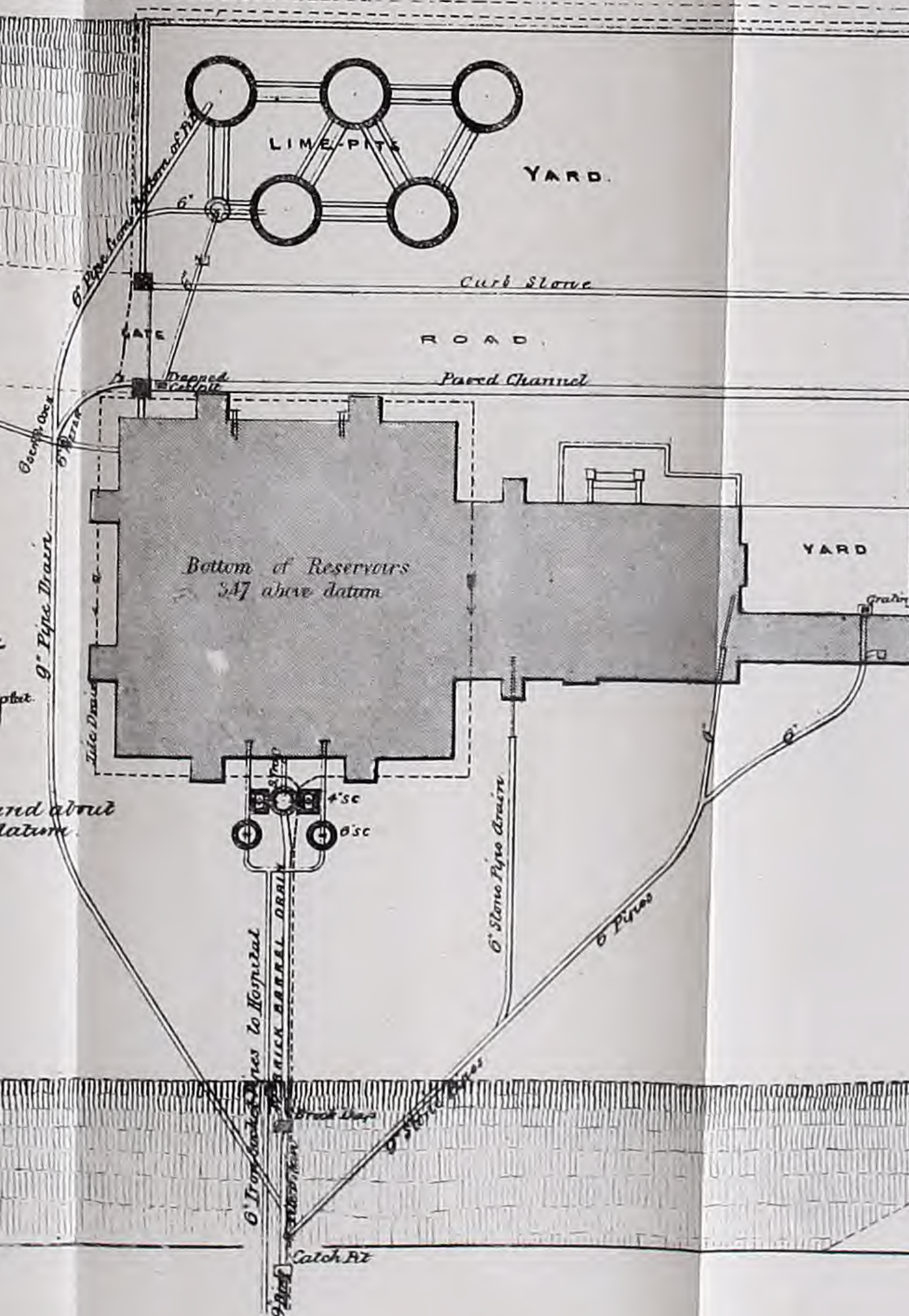


PLAN OF AN AIR CHAMBER
SHewing THE MODE OF ADMISSION OF AIR
THRO' AN EXTERNAL WALL

HERBERT HOSPITAL WOOLWICH, WATER SUPPLY.

DRAWING N^o 23.

OCCUPATION ROAD



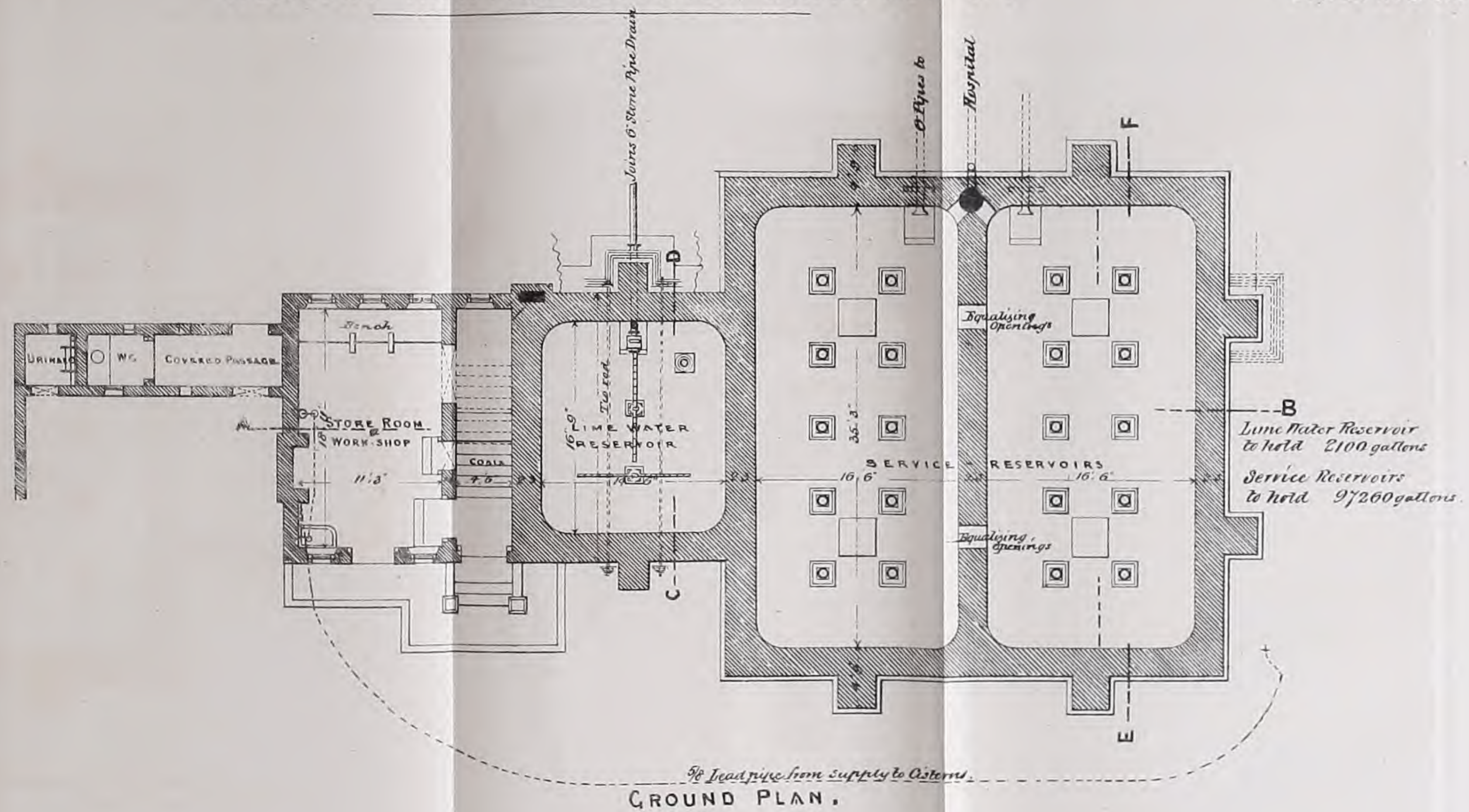
BLOCK PLAN-SHEWING DRAINS PIPES &c

SCALE
10 0 10 20 30 40 50 60 feet

General Surface of Ground about
361' above Ordnance datum

HERBERT HOSPITAL WOOLWICH, WATER SUPPLY.

DRAWING N^o 24.



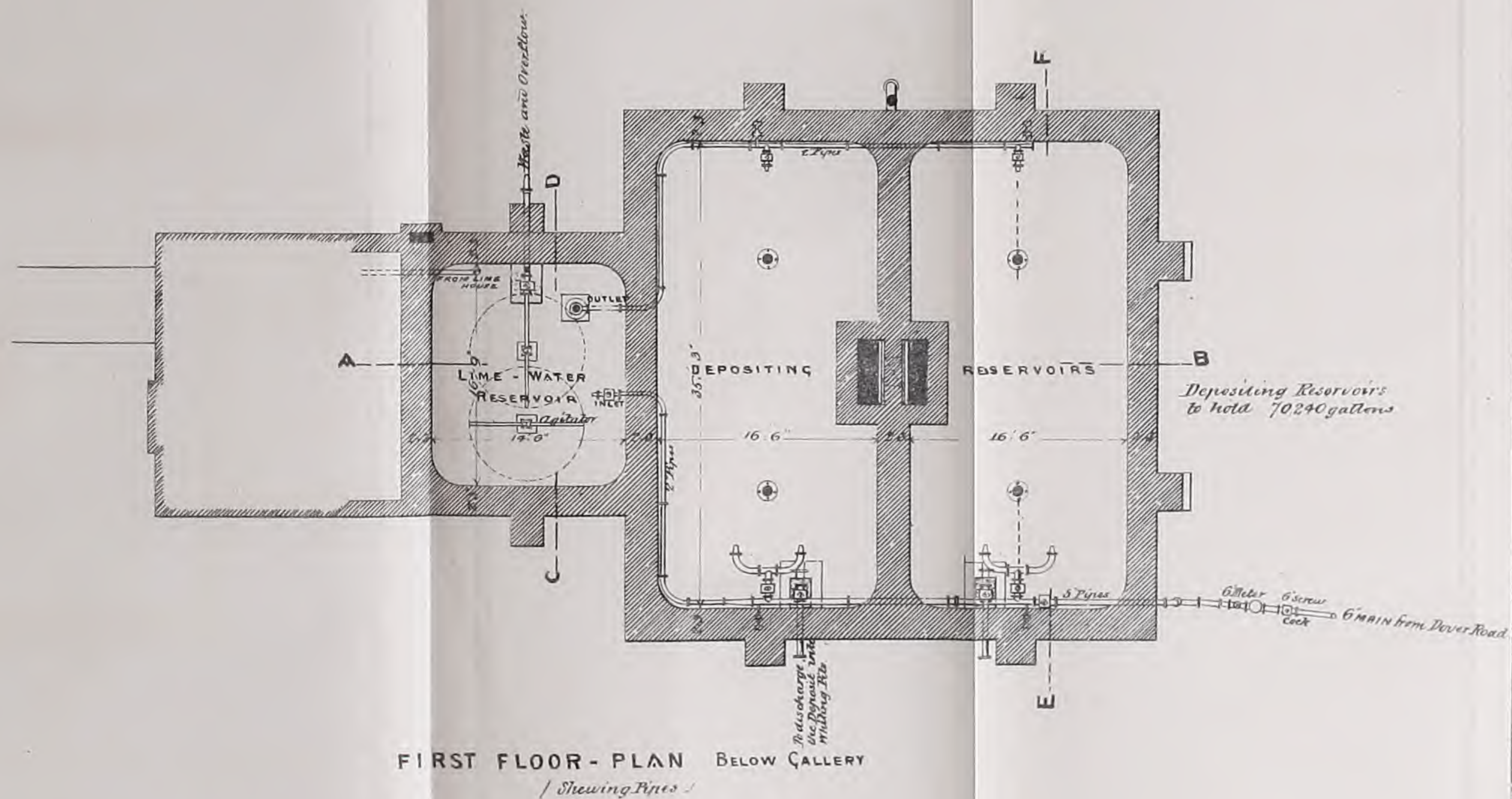
GROUND PLAN.

- SCALE - OF - FEET -

Dark Sam Limber Photo Club

HERBERT HOSPITAL, WATER SUPPLY.

DRAWING N^o 25

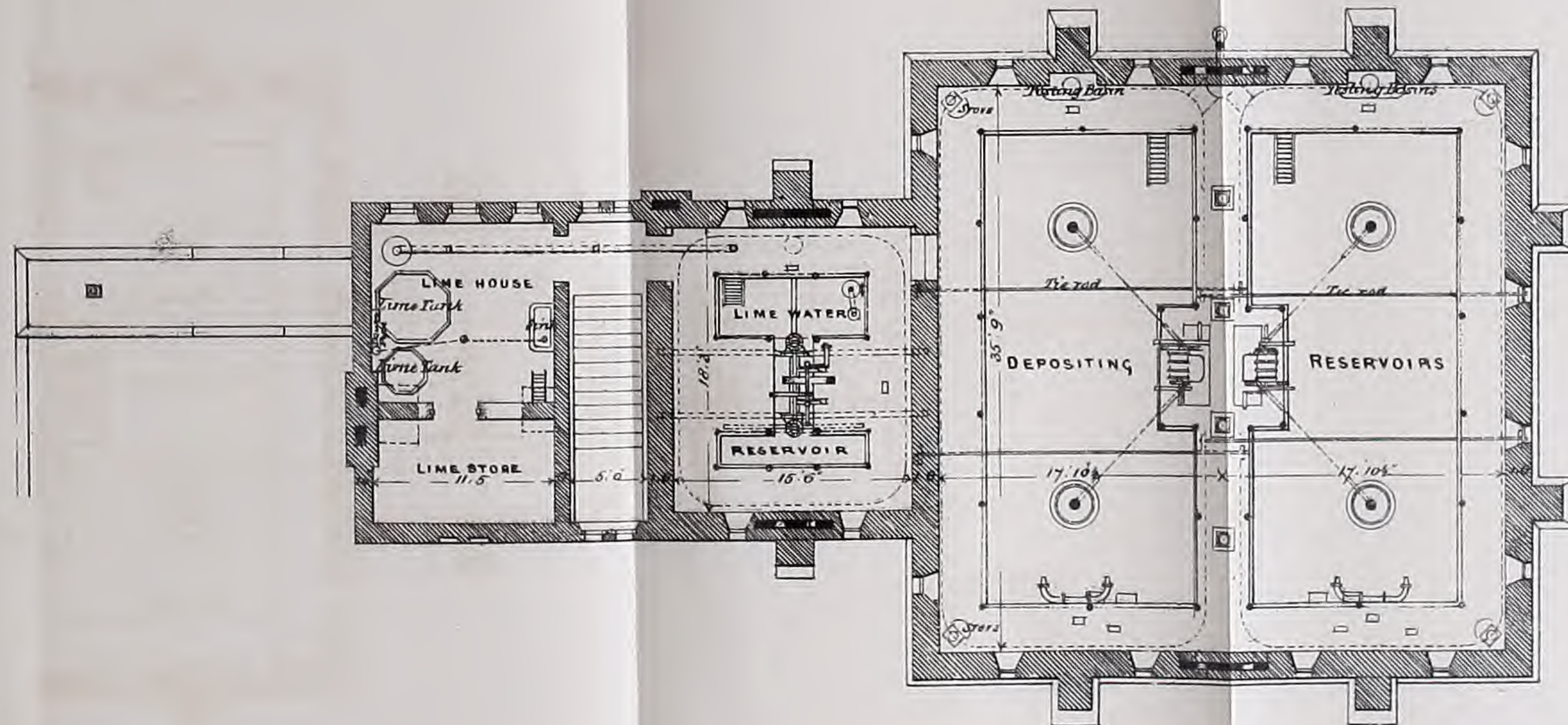


SCALE OF FEET

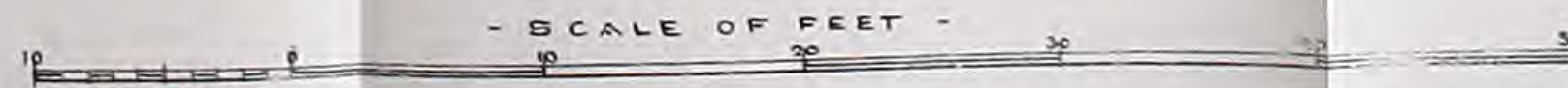
0 10 20 30 40 50

HERBERT HOSPITAL, WATER SUPPLY.

DRAWING N^o 26.

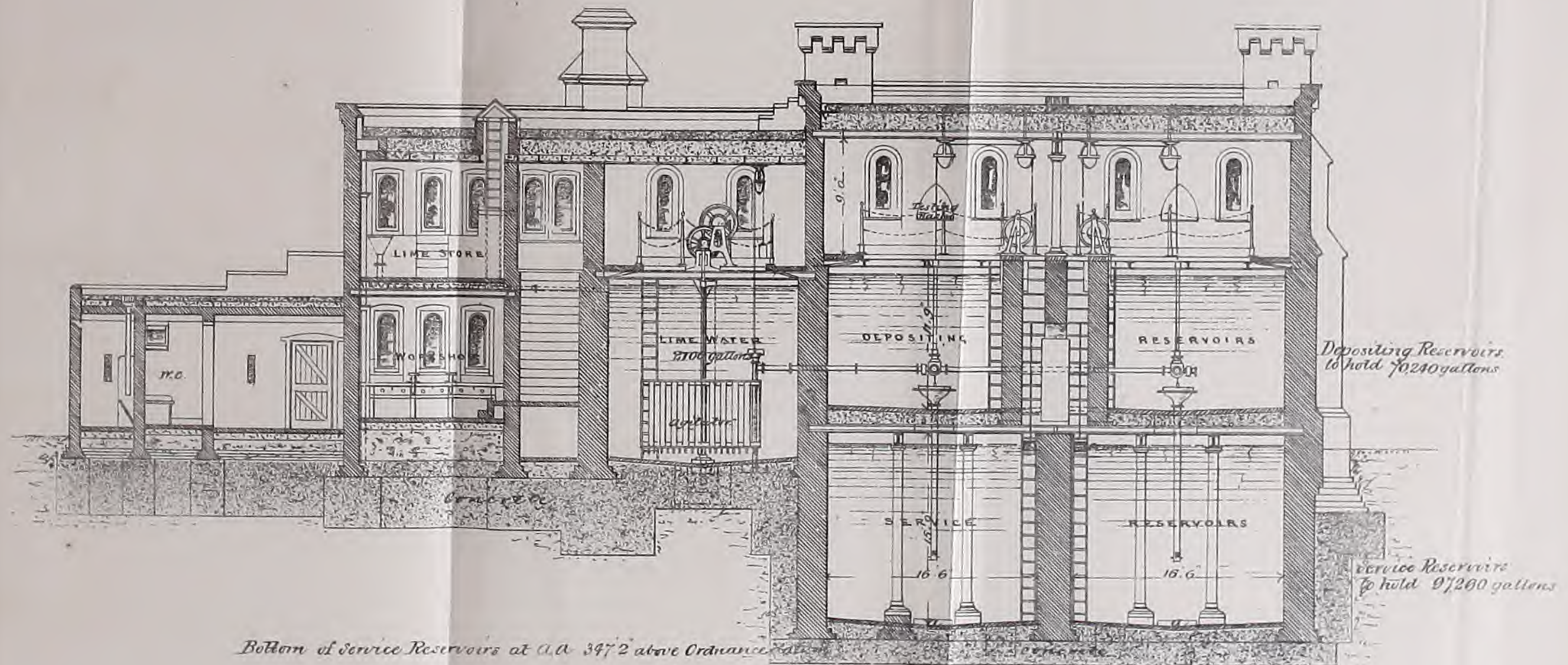


FIRST FLOOR PLAN. ABOVE GALLERY

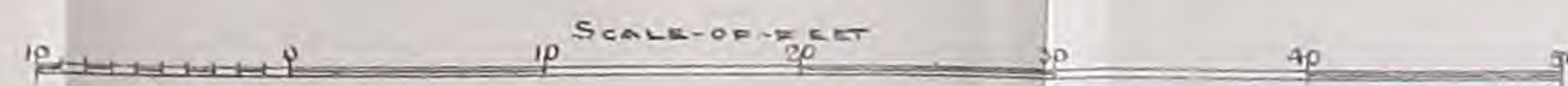


HERBERT HOSPITAL, WATER SUPPLY.

DRAWING N^o 27

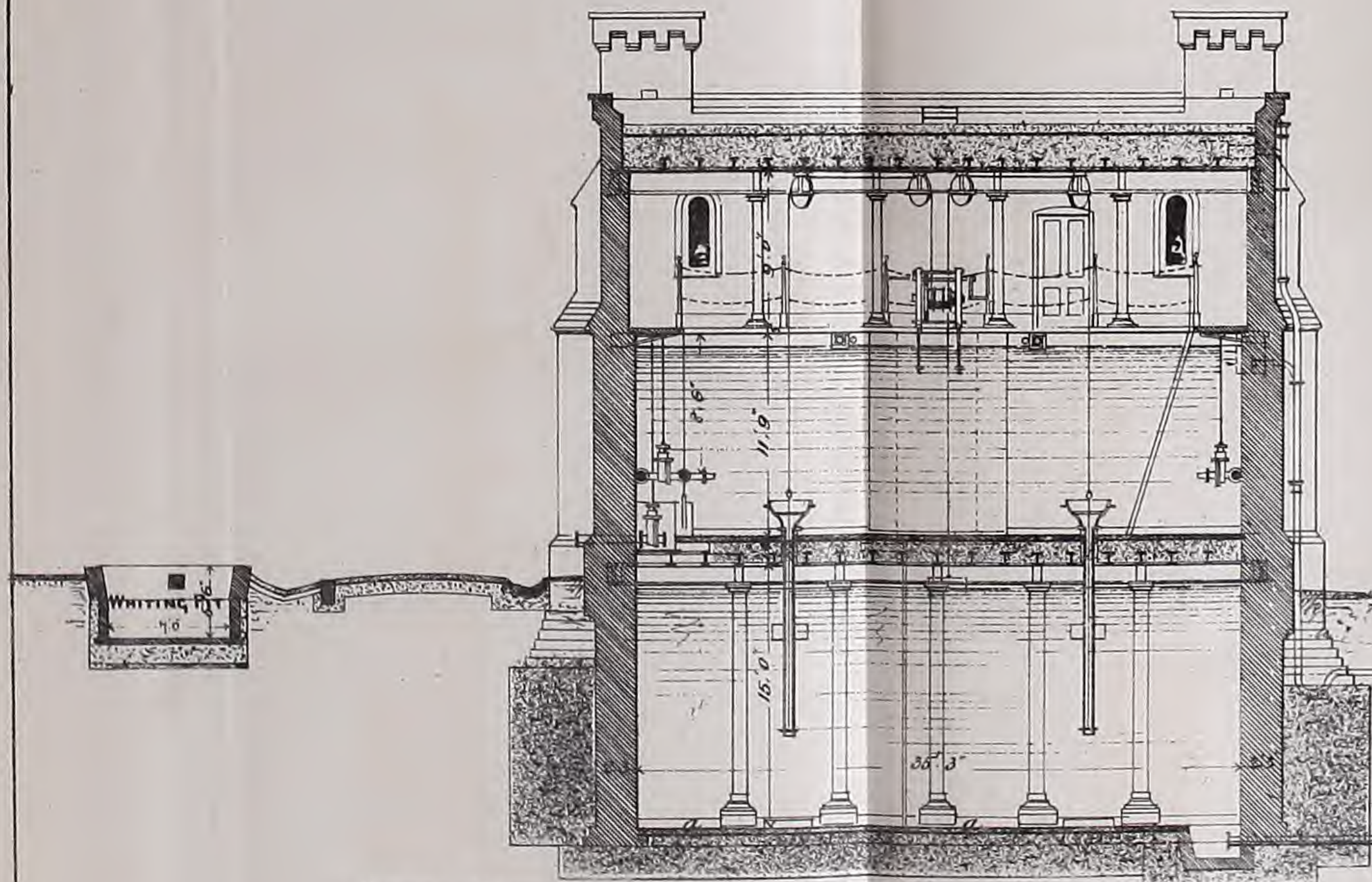


SECTION THRO' RESERVOIRS (A B)



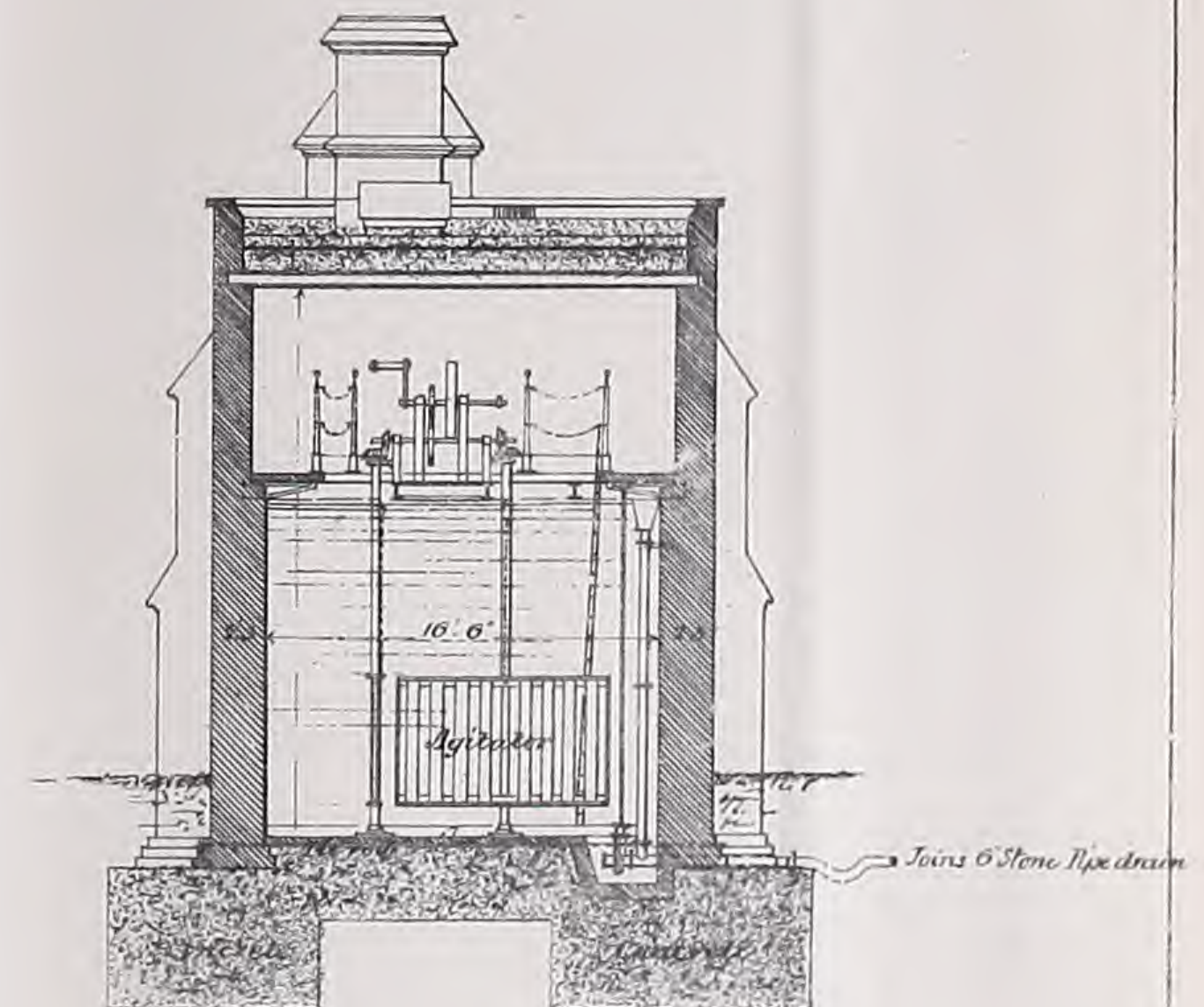
HERBERT HOSPITAL, WATER SUPPLY.

DRAWING N^o 28.

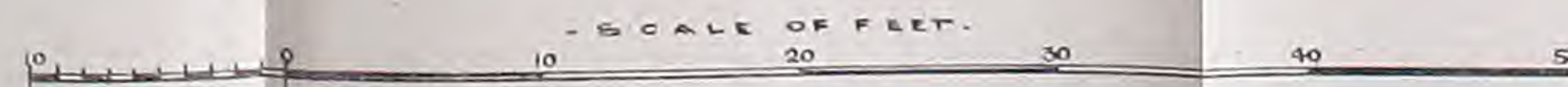


Bottoms of Service Reservoirs at a R 47' 2" above Ordnance datum.

SECTION ON LINE E.F.
Through Reservoirs

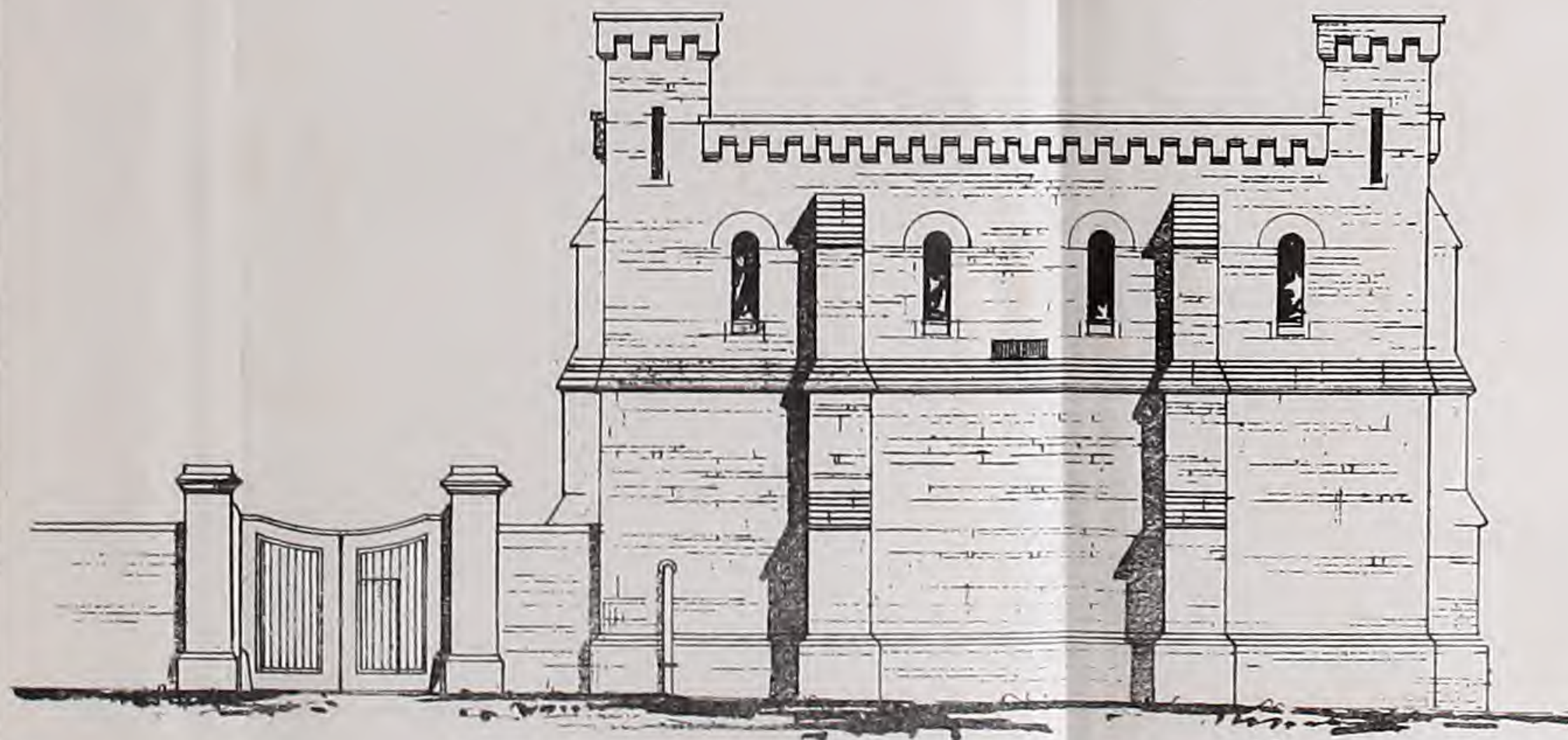


SECTION ON LINE C.D.
Through Lime Tank

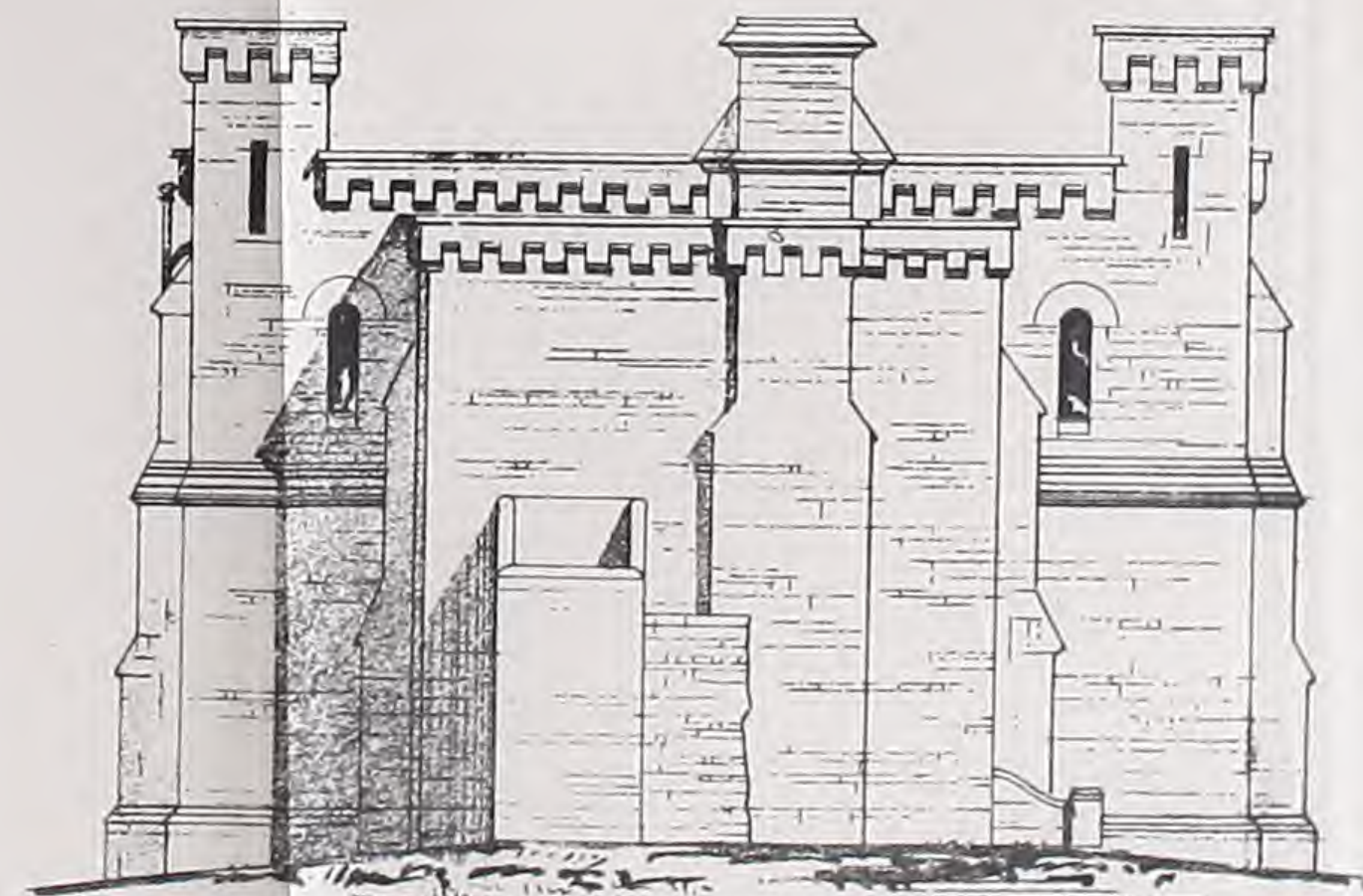


HERBERT HOSPITAL, WATER SUPPLY.

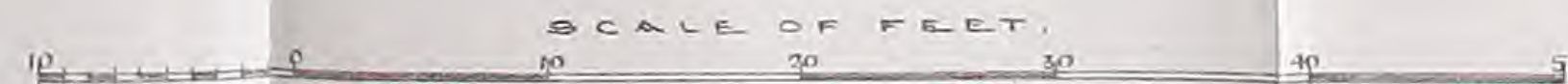
DRAWING N^o 29



NORTH-ELEVATION

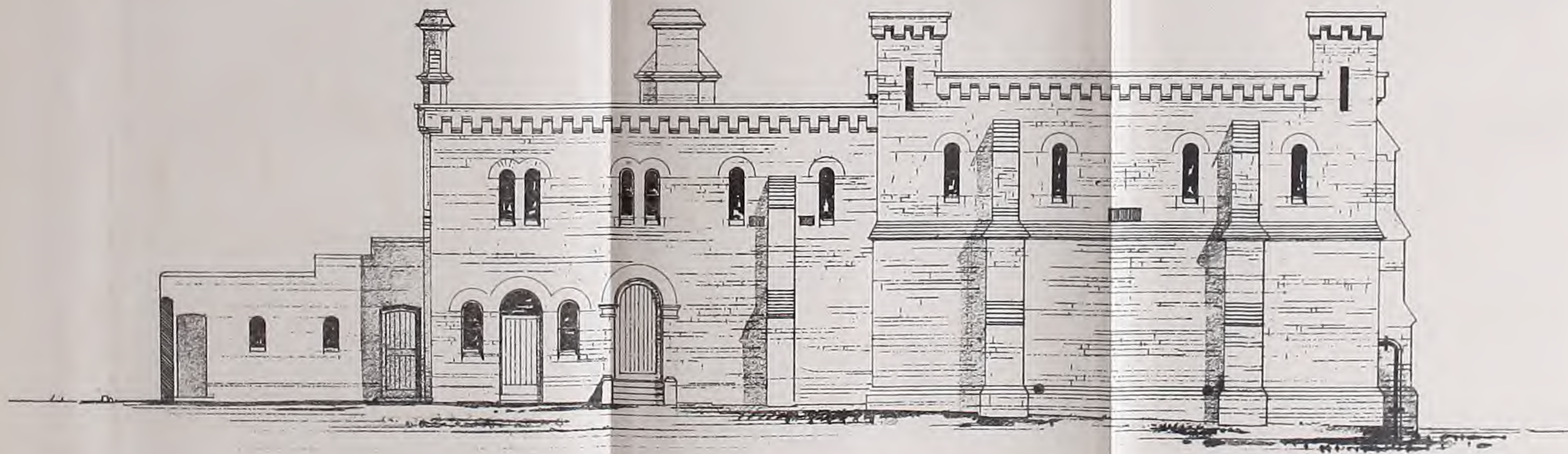


SOUTH ELEVATION.



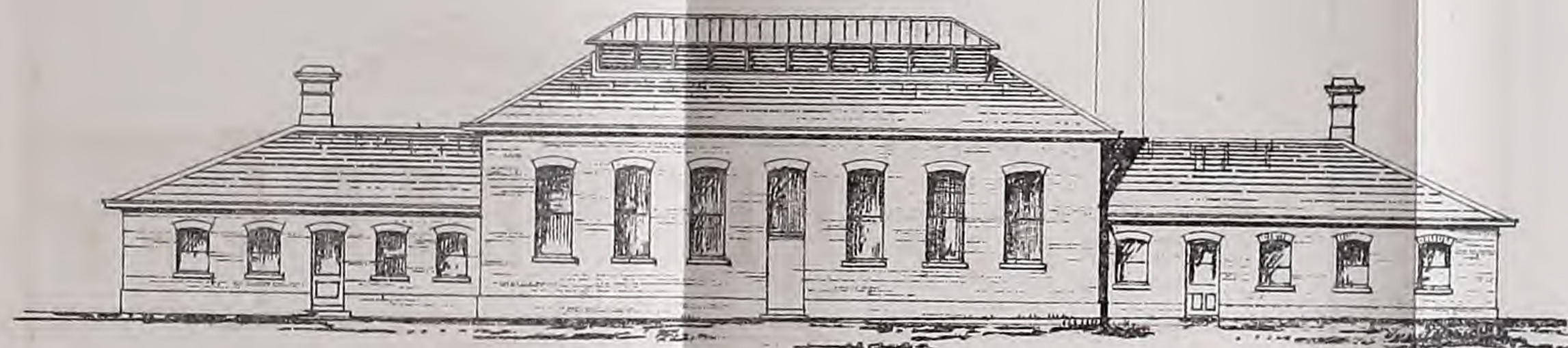
HERBERT HOSPITAL-WATER SUPPLY.

DRAWING N^o 30

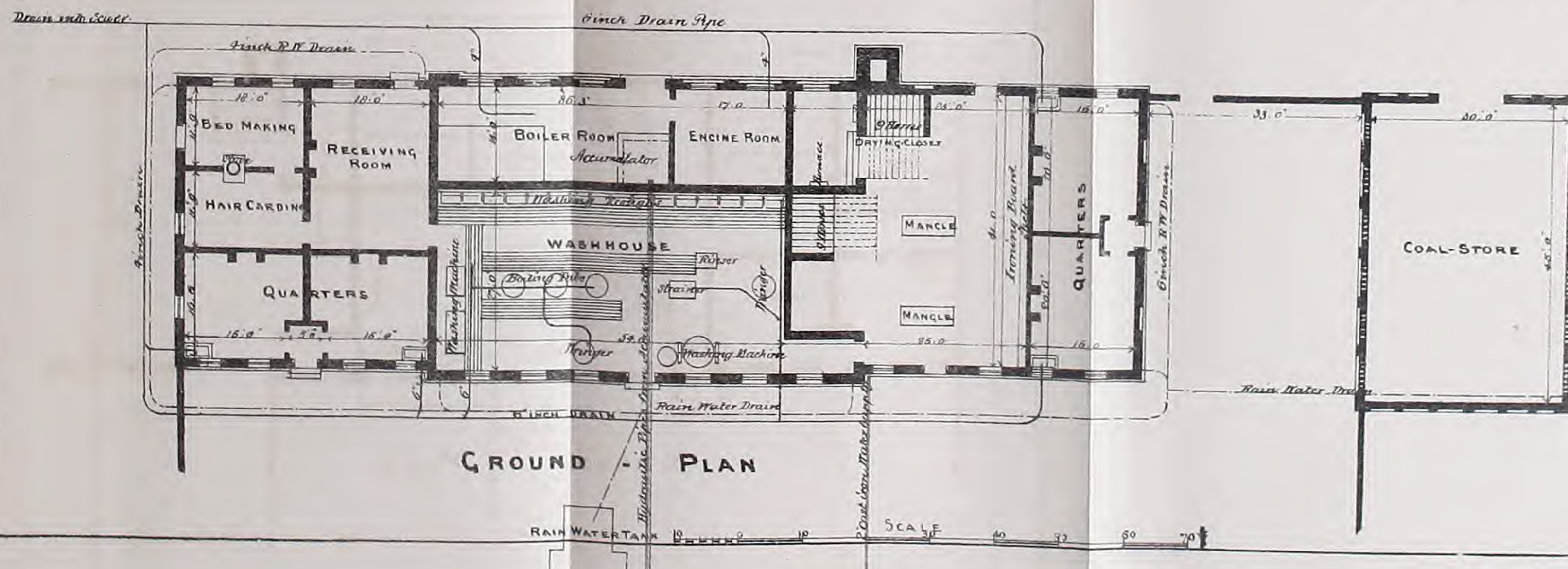


EAST-ELEVATION

SCALE OF FEET



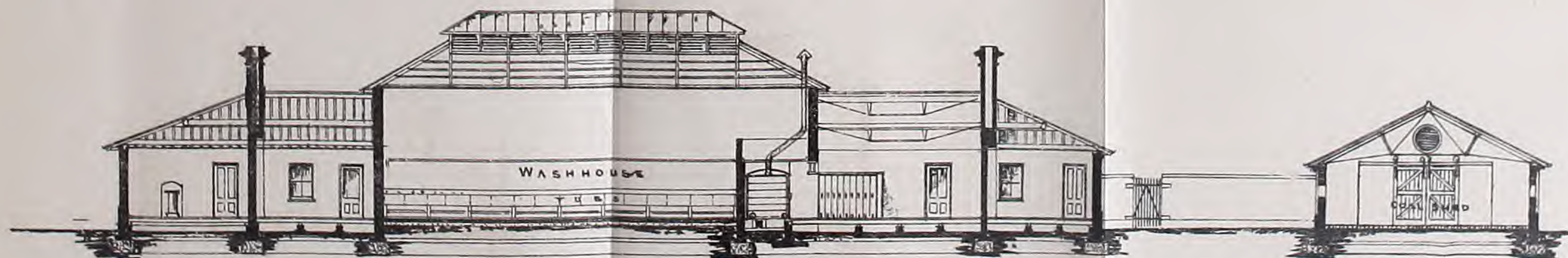
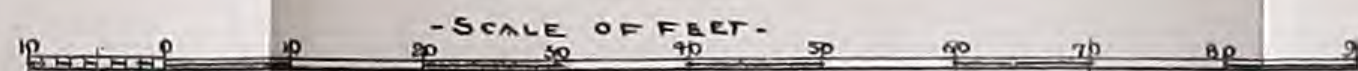
END ELEVATION.



HERBERT HOSPITAL — WASHING ESTABLISHMENT



BACK ELEVATION



LONGITUDINAL SECTION A-B

